

BRITISH
FLOWERING
PLANTS



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BRITISH
FLOWERING PLANTS

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BRITISH FLOWERING PLANTS

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CXLVII.—THE MEADOW CRANE'S-BILL.

Geranium pratense Linné.

IF we attempt to arrange the Natural Orders in one continuous series, it is inevitable that great breaks will appear in their sequence. It is, to adopt the oft-used but instructive comparison of our system of classification to a tree, as if, having traced all the ramifications of one main branch, we had to begin at the base of another main branch to trace in turn its ramifications. There is thus, for example, but little near affinity between the Family *Leguminosæ*, or indeed any of the Order *Rosales*, and the Order *Geraniales*, which Engler's system places next to one another. On the other hand, there seems to be very considerable approximation between this fifteenth Order of the *Archichlamydeæ* and the *Sapindales*, *Rhamnales*, and *Malvales*, which come sixteenth, seventeenth, and eighteenth in this system. Just as we find the insertion of the floral organs, whether hypogynous or perigynous, the main distinction between *Ranales* and *Rosales*, so here the equally unimportant-seeming characters of the bending of the anatropous ovule—so that the *micropyle*, or entrance for the pollen-tube, faces upwards or downwards, and the *raphe*, or adherent stalk, is either *dorsal* or *ventral*, *i.e.* on the upper or lower edge of the ovule—seem to be the most important distinctions between these Orders.

The Order *Geraniales*, as understood by Engler, is a very large one, comprising twenty Families and over nine thousand species. It has cyclic, usually pentamerous flowers, with generally one, two, or three whorls of stamens, and from two to five carpels in a whorl, which, in many cases, separate in the fruit, thus forming a superior schizocarp. There are seldom more than one or two ovules in each carpel; and if there is only one it has its raphe *ventral*, *i.e.* on the under side of the ovule, the side nearest to the axis, and its micropyle facing upwards.

The closely-related Families *Geraniaceæ*, *Oxalidaceæ*, and *Linaceæ* agree further in having heterochlamydeous, polysymmetric flowers and two whorls (or rarely a single whorl) of stamens, the anthers of which burst longitudinally. The Family *Geraniaceæ* includes eleven genera and over 450 species, mostly herbs, native principally to the Warmer Temperate and Tropical regions of the globe. They are often more or less succulent or hairy, and in not a few cases have relatively large and conspicuously massed, or variegated, flowers, indicative of their xerophytic character. It is curious to find some of the South African species of *Pelargonium* rejoicing at one season in the spray of a waterfall, yet capable, under the climatic contrasts frequent in their native country, of resisting prolonged drought. This character may be connected with the prevalence of astringent and aromatic substances in members of the Family. The leaves are usually stipulate and the flowers perfect, with a persistent imbricate calyx, honey-glands on the floral receptacle, protandrous stamens with filaments united at the base, and carpels united into a long-beaked schizocarp.



THE MEADOW CRANE'S-BILL—continued.

Botanists have had to ransack Aristophanes's "Birds" for the names of long-billed birds—cranes, storks, and herons—for the genera which have these fruits. The beak consists of a prolongation of the axis or carpophore in which the styles are incorporated, and from the sides of which strips of tissue, forming the *awns* of the ripe carpels, separate themselves elastically in the bursting of the fruit.

The genus *Geranium*, named in ancient times from the Greek γέρανος, *geranos*, a crane, and thus rightly translated *Crane's-bill*, includes some 160 species, natives of Temperate, and mainly of Northern, regions, of which about a dozen are numbered among British plants. While their five sepals are imbricate, so that two of them have both margins free, two have both margins covered and one has one margin free and the other overlapped, the five petals are *contorted* in æstivation, *i.e.* each has one margin overlapping an edge of the next. The five honey-glands are opposite the sepals: the ten stamens all bear anthers, the outer row ripening them before the inner whorl does so; and the five carpels maturing their stigmas at least later than the outer anthers. The straight outer lignified strands in the beak are denser and contract more in ripening than does the subjacent tissue; with the result that a state of tension is set up, and ultimately these strands burst off, curling outwards from below upwards, but sometimes remaining attached to the central axis at their apices, and each carry away a carpel, which contains a single seed, although in the earlier stage there are two ovules to each carpel.

In the beautiful Meadow Crane's-bill (*Geranium pratense* Linné), which adorns our river-banks and water-meadows, and even occurs in fairly dry hedgerows in the west of England, the deeply-lobed leaves so much resemble those of the Buttercups that it has been called *Crowfoot Crane's-bill*; but Gerard's translation of the Latin name *Gratia Dei*, then in use in Germany, as *Grace of God*, does not seem to have popularised it here. The large violet-blue flowers, protected from honey-robbers by glandular reflexed hairs over most of the plant and a fringe of hairs on the claws of the petals, are visited by a variety of flying insects; and, as all the anthers burst before the stigmas become receptive, the plant is entirely dependent on cross-pollination by their means. As the awns spring away from the central axis of the fruit, the carpels split along their inner surfaces which the coiling of the awn has brought into an upward position, so that the seed is jerked out of the carpel to a distance. The surface of the seed is covered with a network of ridges which may serve to anchor it where it falls.

CXLVIII.—THE LONG-STALKED CRANE'S-BILL.

Geranium columbinum Linné.

THE genus *Geranium* includes perennial, biennial, and annual species, and this character of duration is a chief basis for the subdivision of the numerous species into groups. In the perennial forms, such as the Meadow Crane's-bill (*Geranium pratense* Linné), there is generally a short, thick, præmorse, branched rhizome, firmly anchored in the ground by long root fibres. In *Geranium pyrenaicum* N. L. Burman—a fairly common, large, red-flowered species, which is, perhaps, not indigenous—however, there is a fusiform perennial root and no rhizome is formed. Another group of species, of which *G. columbinum* Linné, the Long-stalked Crane's-bill, is one, though often described as annual, are capable, under certain circumstances, of surviving into a second season, thus becoming biennial. In these no rhizome is formed and the plant is often small and prostrate, though sometimes, as in the case of the common Herb Robert (*G. Robertianum* Linné), spreading out over a considerable area, often of bare chalk or limestone, so as well to hold its own against other plants. Many of these slender species, however, are capable of clambering to considerable heights. They in many cases give off somewhat rigid branches at a right angle to their main stem, or their leaf-stalks spring in the same manner, while the bases of the branches are often swollen. By these means we have seen Herb Robert, *G. columbinum*, *G. molle* Linné, and other species climbing up the inside of a hawthorn hedge to a height of four or five feet from the ground.

The number of flowers on a peduncle, whether one or two, the direction of the sepals, whether spreading or erect, and the throwing off of either carpels or seeds, when the fruit is ripe, are other criteria upon which we base our classification of the species.

The soft downiness of the leaves of several species led to their being known as *Dove's-foot Crane's-bill*; but this is hardly an appropriate origin for the specific name *columbinum*, i.e. dove-like, adopted by Linnæus for the Long-stalked Crane's-bill, since it is almost glabrous. It is, however, noteworthy that there are some stiff adpressed hairs on the stem, which, being in general deflexed, would seem to be probably an efficient protection against unwelcome insect-guests. The division of the long-stalked opposite leaves almost to the base of their blades into from five to seven pinnatipartite segments, the ultimate divisions of which are linear and acute, attracted the attention of the botanists of the seventeenth century. It had before been recognised that several distinct species had been called *Geranium columbinum*. As a matter of fact, those we now know as *G. rotundifolium*, *G. molle*, *G. pusillum*, *G. dissectum*, and *G. columbinum* had all been so called. The first to discriminate the Long-stalked Crane's-bill was apparently John Goodyer, whom Parkinson describes as

“a great lover and curious searcher of plants; who besides this hath found in our countrey many other plants, not imagined to grow in our Land. I wish there were many more of his minde, that not hindring their affaires at spare times, would be industrious to search out and know what the ground bringeth forth, where their occasions are to be.”



THE LONG-STALKED CRANE'S-BILL—continued.

In the library of Magdalen College, Oxford, is a copy of How's "Phytologia Britannica" (1650), the earliest British Flora, which belonged to Goodyer and contains many notes by him. Among these occurs "*Geranium columbinum* fol. majus dissectis, pediculis longissimis flore magno," that is "The Dove's-foot Crane's-bill with much cut leaves, long flower-stalks and a large flower," stated to grow "in several places in Hampshire"; and this note was printed in Merrett's "Pinax" in 1666. Dillenius, in his edition of Ray's "Synopsis" (1724), says that this species was first shown him by Jacob Bobart from fields near Oxford; but that he had himself subsequently found it abundant about Swanley in Kent. On the strength of Bobart's finding it at Oxford, Petiver in his illustrated catalogue of Ray's herbarium calls the plant "Bobart's long cut Crane's-bill."

The graceful droop of the blossoms at the extremity of their long slender stalks is one of the charms of this not very common species, which occurs in hedgerows and pastures on dry gravelly or limestone soil. The flowers are raised above the surrounding vegetation by the elongation of both the main peduncle and the pedicels of the individual blossoms. As these flowers do not exceed three-quarters of an inch in diameter, they can hardly be said to owe much of their conspicuousness or beauty to their size. The large, ovate, green sepals extend slender points between the petals; whilst these latter organs, which are slightly notched with a short, blunt point in the notch, are of an indescribable colour—a rose-colour shot with a bluish bloom—that at once distinguishes them as among the most beautiful of their race. As in the Meadow Crane's-bill and Herb Robert, pure white-flowered varieties occasionally occur.

As stamens and stigmas mature simultaneously, self-pollination is probably, at least, not prevented in this species.

The method of seed-dispersal in this species is essentially the same as in the Meadow Crane's-bill, and the seeds are minutely pitted or finely reticulate. In several related annual species, such as *G. molle* and *G. pusillum*, the carpels break away from their awns and are jerked to a distance with the seed inside them, and in these cases the seeds are smooth. Within the seeds of *Geranium* there is little or no albumen, the radicle is *incumbent* against the back of one cotyledon, and the two cotyledons are convolute, one half of each being folded inside one half of the other. This results in the inner halves being less developed, so that the cotyledonary leaves are oblique.

CXLIX.—THE STORK'S-BILL.

Erodium cicutarium L'Héritier.

THE genus *Erodium*, named by Charles Louis L'Héritier from the Greek ἑρώδιος, *erodios*, a heron, while obviously closely allied to *Geranium* in the general character of its flower and fruit, is markedly different in its leaves, which are generally pinnately veined and lobed, instead of the palmate arrangement of *Geranium*; in having no anthers on the stamens of the inner whorl; and in the spiral twisting of the awns of the carpels. It includes some fifty species, inhabiting Temperate regions, mostly in the north of the Old World and especially in the Mediterranean area, though—on account, no doubt, of their power of seed-dispersal and constitutional adaptability—some species have become very widely spread over the globe. Our common Hemlock Stork's-bill (*Erodium cicutarium* L'Héritier), for example, belongs originally to the Palæarctic Region, from Siberia and North-West India to North Africa and Europe, exclusive of Lapland. Introduced, probably accidentally, into the United States, it has long ago become "social"; and it is now difficult for Californian botanists to realise that it is an introduced plant. Brought there, perhaps, with cattle or hay, it is now valued as furnishing the earliest spring fodder, and is reputed to give an excellent flavour to milk and butter. It has acquired a Spanish name *Alfilaria*, i.e. Needlewort, and in the dry region of South California it is used to provide turf for lawns. Similarly it has spread to the Peruvian Andes, where it flourishes at an altitude of 12,500 feet; whilst it has also become general in Tasmania.

This species is generally annual; but other members of the genus are perennial and, in a few cases, shrubby. Though quite commonly occurring in waste ground, especially in light, sandy, gravelly, or chalky soil, inland, it specially flourishes on sand-hills near the sea; and, although with us it can hardly be termed dominant or social, it often forms an important integral part of the "Fixed dune association" of the ecologists or of the transitional associations between this and the associations of the shifting sands. Here it grows with the Yellow Bedstraw (*Galium verum* Linné), the Ragwort (*Senecio Jacobæa* Linné), and the Sea Convolvulus (*Convolvulus Soldanella* Linné); or with Rest-harrow (*Ononis repens* Linné), Burnet Rose (*Rosa spinosissima* Linné), and Hound's-tongue (*Cynoglossum officinale* Linné), its spreading rosettes of red-tinged stems, finely cut leaves, and bright pink florets forming an attractive feature in the carpeting of the ground.

Its massive tap-root gives it a firm hold in the loose soil, whilst the prostrate stems are effective opponents to the wind. The whole plant is covered with scattered hairs, some of which are glandular and render it viscid; and it has a somewhat unpleasant pungent smell, especially when bruised. The bipinnate leaves, which have lanceolate stipules, long ago suggested a comparison with those of the Hemlock (*Cicuta*); and Linnæus, who retained these plants in his genus *Geranium*, used the specific name *cticutarium* for the earlier descriptive binominal *cicutæ folio*.



THE STORK'S-BILL—continued.

As in *Geranium*, the flowers are borne erect in many-flowered, axillary, umbellate cymes on rather long peduncles, with an involucre of membranous bracts at the base of the cluster. They vary from a third to half an inch in diameter, the smaller-flowered forms being apparently often self-pollinated, whilst the larger-flowered ones are more dependent upon insect aid. There is considerable confusion as to the nomenclature of these varieties; but we can apparently recognise two extreme types. One has small flowers, practically polysymmetric and homogamous or slightly protogynous, shedding their petals within a few hours of their unfolding, having their anthers close to the stigmas, and setting seed readily when self-pollinated. The other type has larger blossoms, with their two posterior petals shorter, broader, and deeper red than the three anterior ones, and marked with three dark lines or honey-guides and a red or green spot at their base. In this type the three posterior nectaries secrete more honey than the others, and the flower is pronouncedly protandrous, the anthers maturing a day before the stigmas and the petals not falling till the second day.

The carpels are hairy and each has a circular pit near its apex and, in some forms, a concentric hollow or furrow below this pit. The carpels do not burst but contract over the single seed they each mature. Owing apparently to a curvature in the lignified portions of the beak of the fruit, the awns take a spiral twist in becoming detached. They are often thrown a considerable distance and are fringed on their inner surface with stiff bristles. The delicately hygroscopic character of the awn and the reflexed hairs on the ripe carpel or *mericarp* itself serve to bury the seed and thus protect it from drought. The free end of the awn catching in any neighbouring object, the awn itself untwists and thus lengthens when moistened, driving the pointed mericarp into the ground: the reflexed hairs prevent its being withdrawn when the awn on drying coils up again; and the next moistening drives the carpel with its contained seed still deeper.

White-flowered varieties of the Stork's-bill occur in a wild state; and the larger, allied species, *E. moschatum* L'Héritier, having been formerly cultivated for the sake of its musk-scented leaves, has acquired not only the popular name of *Muscovy*, but also the curious abbreviation *Covey*. Other old names applied to the Stork's-bill are *Pink Needle* and *Powk Needle*, the latter apparently from the same corruption of the name of the Old World sprite, as in Mr. Kipling's place-name Pook's-hill.

Several species of *Erodium* are grown in gardens, chiefly as rock-plants, their requirements differing but little from those of the Geraniums. Many of the more familiar garden plants popularly known as Geraniums, such as the Scarlet, Tricolour, and Ivy-leaved groups, are species of the mainly South African genus *Pelargonium*, which differs from *Geranium* in having a honey-containing adherent spur forming a slender tube down the flower-stalk from an opening at the base of the posterior sepal, whilst the markings of the petals sometimes emphasise this monosymmetry.

CL.—THE WOOD SORREL.

Oxalis Acetosella Linné.

THE whole Order *Geraniales*, with its generally conspicuous, honey-yielding flowers, adaptations—often complex—for insect-pollination and for seed-dispersal, suggests a high grade in the scale of evolution with its concomitant a comparatively modern geological date of origin. This is even more especially true of the Family *Oxalidaceæ*, for very few groups in the Vegetable Kingdom present such elaborate adaptations in all parts of their structure alike. The Family comprises some 330 species in seven genera, mostly tropical or sub-tropical, but two-thirds of the species belong to the genus *Oxalis*. Most of them are perennial herbs, with scattered, exstipulate, compound leaves, usually exhibiting nyctitropic movements. Their flowers are usually rather large, polysymmetric, perfect, and pentamerous, with a persistent, imbricate calyx, two whorls of monadelphous stamens (those of the outer opposite to the petals), introrse anthers, five carpels united below and superior, but with free styles, and the anatropous ovules with ventral raphe and micropyle pointing upward which characterise *Geraniales*. The fruit is usually capsular, not beaked as in *Geraniaceæ*, but splitting loculicidally, *i.e.* down the midribs of the carpellary leaves, without any detachment of valves. The seeds are usually enclosed in fleshy arils which grow up from their bases and exhibit most remarkable elasticity.

The name of the genus *Oxalis*, from the Greek ὄξυς, *oxus*, acid, occurs in Pliny, but is applied by him to the Sheep's Sorrel (*Rumex Acetosella* Linné); whilst the specific name of our common species *Acetosella*, a diminutive from the Latin *acetosus*, acid, which was the old druggist's name for the plant, also refers to the abundance of oxalic acid which it contains, especially in its leaves, combined with potash.

Most of the species are South American or South African; but their great powers of scattering their seed have given three or four species a very wide distribution. Our Wood Sorrel (*Oxalis Acetosella* Linné) occurs over the whole of the Palæarctic and Nearctic Regions, and extends to altitudes of 4,000 feet in the Scottish Highlands. There are a few shrubby forms; but most species are small, with some kind of underground stem or other food-store. Several South American species, such as *O. tuberosa* Molina and *O. crenata* Jacquin, produce starchy tubers resembling small yellow potatoes, which are eaten under the name of *Oca*: the Mexican *O. Deppei* Loddiges bears scaly bulbs; and in our own Wood Sorrel, which has a slender rhizome, food is mainly stored in the persisting bases of the leaves.

Though the leaflets are sometimes altogether absent—the leaf being then represented by a flattened phyllode, as in *O. rusciformis* Mikan—or may be reduced to two or one, the ternate leaf of our species is generally characteristic of the genus. As we see them in our own woods, they rise from the underground stem, in early spring, on translucent, red-tinged, hairy petioles. The delicate leaflets, at first of a



THE WOOD SORREL—continued.

very vivid green, are markedly obcordate or heart-shaped, are scattered over with soft hairs, and are often reddened or purpled on their under surfaces with anthocyan, which serves probably to convert light rays into heat, and thus enables the plant to manufacture its food in the cooler months of the year. These leaves are not sensitive to mere touch as are those of some species, such as the allied Indian *Biophytum sensitivum* De Candolle ; but, if the sky is overcast, or at night, they fold each leaflet down its midrib and droop them into three vertical planes, thus exposing the minimum of surface to radiation.

Whilst in other species the flowers are often in umbellate clusters, in the Wood Sorrel they rise solitarily from the rhizome, on reddish peduncles, rather longer than the leaf-stalks, with two bracts about the middle of their length. In dull or cold weather the flowers close ; and, in addition to the beautiful delicate blossoms of May, cleistogene flowers are produced later on. The obovate petals cohere at their bases and are veined, or sometimes deeply tinged, with pink or pale violet, and they secrete nectar from a gland projecting at the base of each. The flowers are said only to remain open, under ordinary circumstances, from nine in the morning to six in the evening, but they are not much visited by insects ; and, as in this species, anthers and stigmas mature simultaneously, or nearly so, self-pollination is probably frequent. After fertilisation, the peduncle bends downwards ; but, when the capsule is ripe, it once more bends upwards. The capsules of the short-stalked cleistogene flowers, however, bury themselves in the ground.

The five-sided, five-chambered capsule contains two or three seeds in each chamber. Each seed develops a fleshy aril from its base ; and when the polished black seeds are ripe, and the capsule splits down the five midribs of its carpels, the inner tissue of this aril becomes tense and splits, turning inside out but remaining attached to the placenta, while the seed is thrown to a considerable distance.

The shape of the leaflets obviously gives rise to the Border name of *Hearts* ; while the uncommon *Sleeping Beauty* takes account of their movements. Flourishing as the plant often does in the humus derived from the decaying wood, bark, and leaves of an old stump, the old name of *Stubwort* seems appropriate. Most of the numerous popular names for the species refer, however, to the acidity of the three leaflets or their development about the time when the cuckoo arrives. Such are the German *Sauerklee*, the Portuguese *Trevo azedo*, and the Dutch *Zuurklaver* ; our English *Cuckoo's-meat* or *Gowk's-meat*, the French *Pain de coucou*, the Swedish *Giokmat*, and the Dutch *Koeks-koeks-brood*. The pretty name *Alleluia* is explained by Gerard as

“ By reason when it springeth forth and flowreth . . . *Alleluja* was wont to be sung in churches ” ;

though it has been suggested that this is merely a corruption of the Calabrian name *Iuliola* and the apothecaries' form *Lujula* or *Luzula*.

CLI.—THE TAWNY BALSAM.

Impatiens biflora Walter.

IT is with great diffidence that we venture to retain this representative of the Family *Balsaminaceæ* here, where the group was placed by Bentham and Hooker, rather than follow Engler in transferring it to the Order *Sapindales*. Whilst there are unquestionably many important differences in detail between the *Balsaminaceæ* and the *Geraniaceæ*, somewhat similar in magnitude to those which separate the latter Family from the *Oxalidaceæ*, there seem to us to be many general resemblances suggestive of affinity. Not to speak of such vegetative characters as their succulent herbaceous habit and enlarged nodes—their monosymmetric spurred flowers and explosive fruits (differing though they do from those of *Geraniaceæ*) suggest that Family or the allied *Tropæolaceæ* more than they do any *Sapindales*. While it is always dangerous to rely upon one character for the determination of affinity, it may be doubted whether the character upon which Engler's view is mainly based, viz. the position of the ovules, is sufficiently uniform in either Order to be insisted upon. At the same time, it must be admitted that it is just one of those characters which, being apparently of no physiological or adaptational importance, is likely to be inherited without variation from a remote ancestry or throughout a wide range of affinity. It may be stated as follows:—in *Geraniales* there is either a solitary ovule in each carpel with its micropyle facing upward and the raphe, or adherent stalk, *ventral*, i.e. on the side of the ovule nearest to the placenta; or if there are more than one ovule, some of them may have their micropyles facing downward and their raphes *dorsal*, i.e. adherent to the side of the ovule farthest from the central placenta. In *Sapindales* the ovules are either pendulous with an upward micropyle and a dorsal raphe, which is the case in the *Balsaminaceæ*, or ascending with a downward micropyle and a ventral raphe.

The Family comprises only two genera with some 250 species, belonging to the Tropics and the North Temperate Zone. Their leaves are simple and, though usually scattered, may be opposite; and stipules are absent or are merely represented by glands. The thin, delicate texture of the leaves, and their rapid transpiration, which causes them to flag quickly on being gathered, are characteristic of plants inhabiting damp, shady situations.

Cleistogamous flowers occur in the apparently indigenous Yellow Balsam or Touch-me-not (*Impatiens noli-tangere* Linné) of the north-west of England and Wales, and in the recently naturalised *I. biflora* Walter, which we have here for convenience called the Tawny Balsam; but the ordinary flowers are large and conspicuous, being borne on long axillary peduncles. The slightness of these flower-stalks and the weight of the nectariferous spur causes an inversion of the flower, the structure of which is puzzlingly complicated and has given rise to considerable differences of interpretation. Sepals and petals are alike coloured, and their very



THE TAWNY BALSAM—continued.

unequal development and cohesions make it difficult to decide which parts belong to the calyx and which to the corolla. Although at first sight there appear to be only six leaves to the perianth, of which three are sepals and three petals, there are normally ten leaves, five sepals, and five petals. The two outer sepals are lateral and opposite one another : the two anterior are often suppressed ; and the upper or posterior one, though by the twisting of the flower-stalk it hangs lowest, is the wide pouch or spur. The inner lateral petalline leaves, which are more or less unequally bilobed, represent two pairs of petals—postero-lateral and antero-lateral—each leaf being formed of a petal from each pair, the broad, concave, symmetrical, odd petal being in reality anterior. The five stamens have short, broad, coherent filaments, and introrse anthers united in a cap over the ovary, which are mature when the flower first opens, when the enclosed gynæceum is still rudimentary.

There are five united, multi-ovulate carpels, the partition-walls between which are thin and soon disappear, leaving a persistent central axis to which the seeds are attached. The growth of the young ovary breaks the stamens away at their bases, the pollination of the flowers being effected in England by humble-bees visiting flowers in two different stages of development. In its native country—the eastern United States—*I. biflora* Walter, often known as *I. fulva* Nuttall, the name which we have literally translated, is pollinated, occasionally at least, by humming-birds. The pericarp remains fleshy and sometimes green ; but, as the seeds ripen within it, unequal tensions are set up in it between oblique, partly lignified cells and the outer epidermis, with the result that, if touched, or warmed by bright sunshine, the five valves coil up inwards from below upwards, discharging the seeds with great force. It is to this action that the Balsams owe their generic name *Impatiens*, first used apparently by Dodoens.

It was in 1822 that John Stuart Mill first noticed the American *Impatiens biflora*, with its orange flowers spotted with red and sharply upturned spur, by the banks of the Tillingbourne, in Surrey, it being probably an escape from the gardens at Albury. Since then it has spread to the Wey, from the Wey to the Thames, and from the Thames up the Colne into Hertfordshire, and along streams, canals, and ditches in all directions, and often in great profusion. A smaller, paler-flowered Siberian species, *U. parviflora* De Candolle, is almost as well established.

CLII.—THE NARROW-LEAVED AND CATHARTIC FLAX.

Linum angustifolium Hudson and *Linum catharticum* Linné.

THE Family *Linaceæ* form a well-marked group of nine genera and about 120 species, represented in most parts of the world, the Flaxes, *i.e.* the genus *Linum*, being the most numerous and important genus. The majority of them are annual or perennial herbs, though some are shrubby : they have scattered, or occasionally opposite, simple and entire leaves, with or without stipules : their flowers are in cymes, polysymmetric, usually pentamerous and perfect, with five or ten monadelphous stamens, having sometimes a whorl of alternating staminodes, a syncarpous ovary, and free styles ; and their fruit is usually a superior, many-chambered capsule, often having extra partial partitions formed by the ingrowth of the midribs of the carpels, with one or two seeds in each of the false chambers thus formed. The capsule usually bursts by splitting its septa (*septicidally*), each mericarp thus formed splitting into two valves. The ovules are pendulous with a ventral raphe and upward-facing micropyle ; and in the Flaxes the ripe seed has a mucilaginous testa and contains oil.

There are four species of *Linum* found in Britain in a wild or semi-wild state, and they are distinguished from the little Flax-seed or All-seed (*Radiola linoides* Roth) figured on Plate CLIV, by the parts of their flowers being all in fives, whilst in *Radiola* they are in fours. The Flaxes have thus five sepals, five petals, five stamens, with five staminodes and five carpels, forming an apparently ten-chambered, ten-seeded ovary.

To discriminate between the larger, blue-flowered forms, Sir J. E. Smith was probably right when he said that “the calyx affords the most certain specific characters” ; but this discrimination is intimately connected with the ancient history of the cultivation of Flax, whether for fibre, for oil, or for both. The strong fibrous bast tissue of the slender stems is obtained by “retting” and “heckling,” *i.e.* by steeping the stems in water to remove the cellular tissue by a process of fermentation and to separate the woody axis, and combing the fibres into parallel order for spinning. While the gummy testa of the seed combines with its oily contents to render Linseed valuable for poultices, the oil itself, of which about 38 per cent. exists in the seed of the cultivated Flax, is a most important commercial product. Not only is it the chief drying oil used in paints and varnishes, but in combination with refuse cork it is now extensively employed in the manufacture of linoleum, oil-cloth, and of various substitutes for india-rubber ; whilst the refuse “cake” from which the oil has been extracted is a most valuable feeding and fattening material for cattle.

Alphonse De Candolle, whose study of the history of Flaxes extended over many years, came to the conclusion that before the Aryan immigration the perennial *Linum angustifolium* Hudson was cultivated by the Stone-Age lake-dwellers of North



THE NARROW-LEAVED AND CATHARTIC FLAX—continued.

Italy and imported by those of Switzerland for the manufacture of fishing-lines and nets ; but that the larger annual species *L. usitatissimum* Linné is, perhaps, wild in south-west Asia, has been cultivated in Assyria and Egypt for 4,000 or 5,000 years, and was introduced into northern Europe by the Turanian Finns and into the south of the continent by the western Aryans. The Stone-Age lake-dwellers reaped their perennial many-stemmed Flax, whilst the ancient Egyptians and the Latins in the time of Pliny rooted up their annual crop ; and whilst the name *Flax* belongs to the Teutonic languages of the north, the Greek *λίνον*, *linon*, Latin *linum*, and Celtic *llin* are represented in all the Aryan languages of Central and Southern Europe.

The annual, generally unbranched, *Linum usitatissimum* Linné, with ovate sepals, and capsules seven or eight millimetres across which do not burst when ripe and have smooth partitions, only occurs as an escape from cultivation in Britain ; and in fact is not known wild with much certainty anywhere. A form known as *L. crepitans* Boeninghausen (*L. humile* Miller), smaller, more branched, with capsules bursting suddenly when ripe and with hairy partitions, seems more certainly wild in south-west Asia, and is much closer in character to our Narrow-leaved Flax. This last, *Linum angustifolium* Hudson, seems truly wild on dry, sandy, and chalky soils chiefly in the south of England. It is generally perennial, sending up many stems : its pale lilac-blue flowers do not exceed three-quarters of an inch in diameter, and the sepals are elliptical and three-ribbed. The much rarer *L. perenne* Linné, with larger, bluer flowers, has obovate five-ribbed sepals.

The slender, little white-flowered Cathartic Flax (*Linum catharticum* Linné) is easily recognised, its thread-like, widely-forking stems being familiar objects in dry pastures or heaths, while it is exceptional among Flaxes in having its leaves in opposite pairs. Johnson, in his edition of Gerard's "Herball" (1633), gives interesting accounts of how Turner, visiting Gesner, about 1540, described to him the rustic use of this species in England as a purgative ; and of how John Goodyer first heard its popular name *Mil-mountaine*, and its use in an infusion of white wine, from a Winchester apothecary, in 1617.

The flowers of the Flaxes being generally homogamous, self-pollination would seem in most species to be at least possible ; but they secrete honey, and the larger, blue-flowered forms are freely visited by various kinds of flying insects. *Linum perenne* Linné and many exotic species are dimorphously heterostyled, and in some of these cases no seed is set unless the flower is pollinated with pollen from one of the other type.

The form of the seed often constitutes a useful distinction between allied species, and whilst those of *Linum usitatissimum* are pointed, those of *L. angustifolium* are slightly hooked at the apex.

CLIII.—THE MILKWORT.

Polygala vulgaris Linné.

THE Family *Polygalaceæ* is decidedly an isolated one, with a complex floral structure which at once suggests a high grade of specialisation. It includes some 700 species in fifteen genera, belonging to Temperate and Tropical regions but represented in most parts of the world, more than half the species belonging to the genus *Polygala*. They comprise herbs, shrubs, climbing plants, and small trees, and have simple, entire, exstipulate leaves, while the flowers, which are in bracteate spikes or racemes, have a curiously misleading resemblance in form and in their method of pollination to those of the *Papilionaceæ*. Each flower is in the axil of a bract and has two lateral deciduous bracteoles and five imbricate persistent sepals, the odd one posterior and the two lateral ones large and petaloid, forming "wings," to which the conspicuousness of the flower is due. Of the five petals normally present and alternating with the sepals, the two lateral ones are sometimes absent, while the two posterior and one anterior are more or less united into a tube and to the split tube formed by the filaments. It is noteworthy that, unlike the case of the *Papilionaceæ*, the odd sepal here is posterior, and the keel-like anterior portion of the corolla is formed by one, instead of two, petals. This anterior petal ends in a hood with a crest of two tufts of finger-like lobes, which, with the coloured and green-veined lateral sepals, form the most striking features of the blossoms. Of the ten stamens in two whorls, of which some traces can be detected, both the posterior and anterior are suppressed, so that eight remain, which are united into an epipetalous tube below, but separate above into two lateral sets of four each, usually one-chambered and each opening by a terminal pore. The gynæceum usually consists of two united and superior antero-posterior carpels each containing one anatropous ovule, with a single terminal style ending in two lobes, one a spoon-shaped stigmatic hollow and the other a viscid disc. When the flower is visited by an insect in search of honey, the keel is depressed by its weight and the essential organs emerge from it, much as in the *Papilionaceæ*. Coming in contact with the viscid disc, the proboscis of the insect-visitor is rendered sticky, so that some pollen from the tubular anthers adheres to it. This, when the insect passes to the next flower, will be swept off into the spoon-like stigmatic hollow. In *Polygala*, the only European genus, the fruit is a compressed capsule, enclosed in the persistent calyx, and bursting, when ripe, loculicidally, *i.e.* along its two margins, giving the plant a further misleading resemblance to the *Leguminosæ*. The seeds are pendulous with the raphe ventral, a downy testa, and a trilobed aril at the hilum or basal scar of attachment.

Though our three or four British species are all low-growing, little plants, the dwarf, shrubby, evergreen Bastard Box (*Polygala Chamæbuxus* Linné) of Central Europe, often seen in our shrubberies, has relatively large and fragrant cream-coloured



THE MILKWORT—continued.

or yellow flowers tipped with purple; and several South African species, with pretty rose-coloured blossoms recalling those of the Rest-harrow, are familiar in our greenhouses. One of the most striking characters, however, of our British species is the occurrence—frequently side by side and thus under apparently identical conditions—of varieties differing in nothing save the colour of their flowers—which may be pink, deep rose-colour, light blue, dark blue, white or striped with blue and white—and, to a very slight extent, in their date of flowering.

A careful tabulation of the date of flowering of British plants has shown that the blue ones on the average flower considerably the earliest, then, in order, the whites, purples, and lastly the yellows and reds; and a similar order prevails among the varieties of the Milkworks. The Common Milkwort (*Polygala vulgaris* Linné) flowers on an average about the 8th of May, the earliest date recorded in the south of England being April 24th and the latest for its first appearance in the year being June 13th. The less common Chalk Milkwort (*P. calcarea* F. Schultz) flowers on an average on May 2nd, or between April 19th and May 18th; but in each case the blue variety blossoms a day or two before the white, and the white a day or two before the red-flowered form.

The occurrence of these sharply contrasting colours side by side is suggested as the probable origin of the name *Four Sisters* which is used for the Milkwort in County Waterford; while the general season of its blossoming is the main reason for a series of names that we owe in the first case to the happy instinct of Gerard.

“Milkewoort,” he says, “is called by *Dodonæus*, *flos Ambarualis*: so called because it doth especially flourish in the Crosse or Gangweeke, or Rogation weeke; of which floures, the maidens which use in the countie to walke the procession, doe make themselves garlands, and nosegaies: in English we may call it Crosse floure, Procession floure, Gang floure, Rogation floure, and Milkewoort.”

The German *Kreuzblume*, the Dutch *Kruisbloem*, and the Danish *Kaarsblomster* may all be derived from this English proposal; but the Swedish *Jungfru mariælin* must have an independent origin. Though several species of *Polygala* have medicinal properties, there seems no warranty for the generic name, which is derived from the Greek *πόλυς*, *polus*, much, *γάλα*, *gala*, milk, and occurs in Dioscorides; but it is, of course, the origin alike of our own *Milkwort*, the German *Milchblume*, the French *Laitier*, and the Spanish *Lechera*.

CLIV.—ANALYTICAL DRAWINGS OF THE CRANE'S-BILL ORDER.

(*Geraniales*.)

THE eight types represented on this Plate, diverse as they are, all belong to the Order *Geraniales* in the wide sense in which we take that name. Those in the first three lines of figures belong to the Family *Geraniaceæ*, representing respectively *Geranium pratense* Linné, the Meadow Crane's-bill; *G. columbinum* Linné, the Long-stalked Crane's-bill; and *Erodium cicutarium* L'Héritier, the Common Stork's-bill.

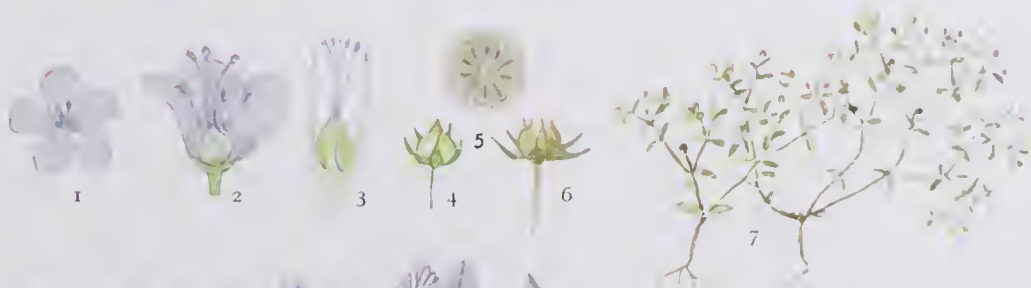
In the first line, that representing the Meadow Crane's-bill, the first figure is a flower in longitudinal section, of natural size, showing plainly the two whorls of stamens; Fig. 2 is a sepal; Fig. 3, the essential organs; Fig. 4, a slightly magnified view of the gynæceum; Fig. 5, the calyx and young fruit; Fig. 6, the young fruit with the calyx removed, showing the remains of the stamens; and Fig. 7, the fruit in the act of dehiscence. These figures show well that the central column from which the awns separate only extends upward through part of the length of the style.

The second line represents *Geranium columbinum* Linné, Fig. 1 being a flower as seen from above, natural size; Fig. 2, the calyx; Fig. 3, a petal; Fig. 4, the essential organs; Fig. 5, the calyx and young fruit, slightly enlarged; Fig. 6, the gynæceum; Fig. 8, the ripe fruit; and Fig. 7, showing the mode of dehiscence.

The third line represents the Stork's-bill (*Erodium cicutarium* L'Héritier), Fig. 1 being a flower as seen from above, of natural size; Fig. 2, the hairy sepals; Fig. 3, the gynæceum; Fig. 4, the essential organs, showing honey-glands and staminodes; Fig. 5, the young fruit, with one sepal; and Fig. 6, two detached ripe carpels, showing the spirally-twisted bristly awns.

The fourth line represents the Wood Sorrel (*Oxalis Acetosella* Linné), the type of the well-marked Family *Oxalidaceæ*. Here Fig. 1 is a flower fully open, a position in which they are not often seen; Fig. 2 is a flower in longitudinal section and slightly enlarged, showing the two whorls of stamens and honey-glands; Fig. 3 shows the essential organs, enlarged; Fig. 4, a young fruit with the calyx; Fig. 5, one a little later; Fig. 6, one just splitting down the backs of its chambers; Fig. 7, a cross section, showing the five-lobed outline; Fig. 8, one of the ribbed seeds, natural size; Fig. 9, the same enlarged, with its fleshy aril on; and Fig. 10, the same, without the aril, showing the raphe.

The fifth line represents the Tawny Balsam (*Impatiens biflora* Walter), often spoken of as *Impatiens fulva* Nuttall, belonging to a Family which is not, perhaps, rightly placed here. Fig. 1 shows a flower in vertical section, of natural size, the abruptly curved point of the wide-mouthed spur being characteristic of the species. Fig. 2 shows the stamens nearly covering the gynæceum, enlarged; Fig. 3, the same, as the anthers burst; Fig. 4, a young gynæceum; Fig. 5, the same when ripe;



ANALYTICAL DRAWINGS OF THE CRANE'S-BILL ORDER—continued.

Fig. 6, the same dehiscing, the carpellary valves having coiled up inwards, dropping seeds ; and Fig. 7, one of the seeds.

The sixth line begins with the analysis of the Narrow-leaved Flax (*Linum angustifolium* Hudson), Fig. 1 representing a flower as seen from above, of the natural size ; Fig. 2, the same in section ; Fig. 3, the essential organs ; Fig. 4, a young fruit with the calyx ; Fig. 5, a cross section of the fruit, enlarged, showing the ten apparent chambers, each containing a seed ; and Fig. 6, a ripe fruit dehiscing into valves.

Fig. 7 in this line shows two plants of the minute Flax-seed or All-seed (*Radiola linoides* Roth), the sole representative of its genus, frequent on damp heaths, where, numerous plants often growing side by side, it is not easily overlooked, although never more than four inches high. It is an annual, with repeatedly-forked, thread-like stems, forming a typical dichasial cyme. The slender stems, the opposite pairs of minute, ovate-acute leaves, and the fugacious white petals all recall *Linum catharticum* Linné ; but in this plant the floral whorls are all in fours and the sepals are deeply three-cleft. The numerous little round capsules, terminating its many branches and closely resembling the “bolls” or fruits of the Flaxes, have given it the names of *All-seed* or *Flax-seed* ; but the scientific name *Radiola*, a diminutive from the Latin *radius*, a ray, has been variously explained as taken from the valves of the dehiscent capsule, resembling the spokes of a wheel, or from the many widely divergent branches of its stem. The specific name *linoides* merely means “resembling Flax.” Internally its capsules closely reproduce the structure of those of *Linum*, but with four carpels instead of five, and accordingly eight apparent chambers and eight seeds.

The last line on the Plate represents the Milkwort (*Polygala vulgaris* Linné), Fig. 1 being a flower seen sideways ; and Fig. 2, one seen from above, both natural size. Fig. 3 is a flower seen from below, enlarged ; Fig. 4, a longitudinal section ; Fig. 5, the gynæceum ; and Fig. 6, the andrœcium, all somewhat enlarged. Fig. 7 is a young capsule with the calyx, and Fig. 8, a section of the same ; whilst Fig. 9 is an enlarged view of Fig. 8. No attempt has been made here to emphasise the veining of the “wing” sepals, which forms one of the most important distinctions between our closely allied British species. In *Polygala vulgaris* Linné they have an almost unbranched central vein prolonged into the point of the sepal, whilst the two lateral veins branch freely, their branches re-uniting and looping on to the central one.

CLV.—THE WOOD SPURGE.

Euphorbia amygdaloides Linné.

THE most difficult problem, perhaps, that faces the systematic botanist to-day, in the endeavour to make the Natural System of classification more in accord with the facts of structure, is the placing of the apetalous Families alongside their true affinities. Some of them may possibly consist of persistent primitive types ; but the majority certainly present characters indicative rather of the degeneration, or comparatively recent simplification, of higher, *i.e.* more complex, structures. The Spurge Family or *Euphorbiaceæ*, for instance, the fourth largest Family among Flowering Plants, comprising as it does over 4,000 species in some 220 genera, having usually a ring of carpels, sometimes to a considerable number, which separate when ripe without any prolonged carpophore, have been very generally considered to be nearly akin to the *Malvales*. As, however, they have anatropous ovules, one or two in each carpel, with ventral raphe, it is thought that their true affinities may rather be with the *Geraniales*.

The Family does not extend into Arctic latitudes and, though otherwise cosmopolitan, may have originated in the Tropics, where it is now largely represented by arborescent species. It is among these tropical trees that the latex, generally white, milky, and acrid, which forms such a striking feature of the group, is most abundantly secreted, although it occurs also in our British herbaceous representatives of the Family. This, perhaps, lends support to the view that a main purpose of this acidity is to protect such perennial or woody plants from the depredations of boring beetles.

A very large proportion of the Family are xerophytic, this being especially the case with the many African representatives of the genus *Euphorbia* itself. These very generally lose their leaves and develop stipular thorns, the ordinary leaf-functions being carried on by the green stems and branches. Their stems may assume nearly spherical forms, or become deeply-ridged columns with a thickened cuticle and few stomata, so as to check transpiration ; and so closely do they reproduce the American desert forms of the *Cactaceæ* that, when not in flower, they are often quite difficult to distinguish from them. The interior of these stems is largely occupied by water-storing cellular tissue.

The leaves in this Family are usually scattered and stipulate, and there is a great variety in the types of branching of the inflorescence ; but the flowers are generally small, and always unisexual, polysymmetric, and hypogynous. There may be a perianth, though it is often absent, as it is in the genus *Euphorbia*. Three is the most usual number of carpels present ; and they very generally coil up spirally when ripe and open so as to discharge the seeds explosively. The ovule has a fleshy aril round the micropyle, which persists in the seed. In the seeds or "beans" of



THE WOOD SPURGE—continued.

the Castor-oil plant, for instance (*Ricinus communis* Linné), which strikingly resemble beetles, this aril represents the head of the insect.

In the large genus *Euphorbia*, of which there are some six hundred species, the small inflorescences are often rendered more conspicuous by leafy bracts. In our twelve British species these are a pale yellowish green; but in the sub-genus *Poinsettia*, often grown in our greenhouses, they form large handsome scarlet leaves. The inflorescence of *Euphorbia* itself is somewhat puzzling. It is enclosed in a little five-toothed, cup-like structure termed the *cyathium* (from the Greek *κύαθος*, *kuathos*, a wine-cup), formed of five united bracteoles, which bears on its edge in four of the sinuses between the teeth crescent-like yellow glandular bodies which secrete a little nectar. This cup encloses a number of staminate flowers, each consisting of a single stamen and one central, *i.e.* terminal, female flower. Five staminate flowers originate first, one opposite to each bracteole of the cyathium, and each of these is succeeded by others in a *cincinnus*, or heterodromous unilateral cyme. Each staminate flower consists of a single stamen on a short pedicel; and that this stamen constitutes a flower, and that the stalk below the little articulation is pedicel and the part above it filament, is shown by the allied African genus *Anthostema*, in which there is a perianth at the point corresponding to the articulation. The female terminal flower develops before the staminate ones and hangs over the edge of the cyathium on a relatively long pedicel. It consists of three carpels, united in the ovarian region, with styles each bifurcating above.

The Wood Spurge (*Euphorbia amygdaloides* Linné) is, perhaps, the handsomest of our British species. It has a perennial, woody rhizome, from which it sends up stout, erect biennial shoots. These may be seen as crimson stalks surmounted by a tuft of blue-green lanceolate leaves in our March woodlands, and they do not flower until their second season. They then hang downwards in a paler green shoot, the junction between the growth of the two seasons being readily distinguishable. By April the new shoot stands erect and branches into an umbellate group of five to ten slender branches, bearing many pairs of vivid pale green bracts, united at their bases so as to form an almost circular disk. The uppermost of these will generally form a shallow cup in the centre of which are three cyathia. As, in a sad little poem, Dante Gabriel Rossetti sang—

“The wood-spurge has a cup of three,
 . . . three cups in one.”

In autumn the leaves and stems may be alike of a brilliant crimson.

CLVI.—DOG'S MERCURY.

Mercurialis perennis Linné.

WITH no particular charm of individual form or of floral colour or perfume, the carpet of verdure which it affords at an early season in spring gives us a kindly feeling for the Dog's Mercury, although we should never think of growing it in a garden or of gathering it for a bouquet. It often forms a marked feature in the landscape. Thus Dr. C. E. Moss, writing, in "Types of British Vegetation," on the Mountain Limestone of Derbyshire, says that it is much more abundant in woods on calcareous soils than on others :—

"On soils," he says, "which, during the summer months, may become temporarily very dry, sheets of dog's mercury (*Mercurialis perennis*) often occur; and this plant is in Derbyshire very frequently associated with the moschatel (*Adoxa Moschatellina*). At the beginning of April, in the Derbyshire dales, the dog's mercury is about three inches high, its leaves are beginning to unfold, and a few stamens are ripe. At this time of the year, the moschatel is here flowering abundantly, and is almost hidden by the young shoots of the dog's mercury. In the fairly dry portions of the ashwoods of the Peak district, this plant society of dog's mercury and moschatel is a characteristic feature. The society is an excellent example of what Woodhead terms a 'complementary' society, as the roots of the dog's mercury reach down to lower layers of soil than the roots of the moschatel, whilst the small and delicate shoots of the *Adoxa* receive their necessary shade from the larger and more vigorous shoots of *Mercurialis*. Before the end of June, *Adoxa* has entered on its long period of dormancy; and the dull green leaves of the dog's mercury, hiding its ripening berries, occur in extensive and monotonous stretches. It may, therefore, be said that the roots of the two species are edaphically complementary and the shoots seasonally complementary."

So too Messrs. Tansley and Rankin, writing in the same volume on the ground vegetation of the beech "hangers" on the sloping chalk hills of the southern counties, add :—

"in places where the foliage canopy is comparatively thin, *Mercurialis perennis* is the typical dominant, often covering the ground in continuous sheets, while *Sanicula europæa*, *Viola Riviniana*, *V. sylvestris*, *Fragaria vesca* and *Circæa lutetiana* are generally abundant and locally dominant. *Viola hirta*, a pronounced calcicole, is also abundant and characteristic. The orchids *Cephalanthera grandiflora*, and the rarer *Helleborine violacea* and *H. atrorubens*, are also characteristic, and *Habenaria virescens* (*chloroleuca*) is frequent. *Helleborus viridis*, *H. fætidus*, *Atropa Belladonna*, *Daphne Laureola*, and *Ruscus aculeatus* are characteristic species of the more open spots in or on the outskirts of beechwoods."

The small genus *Mercurialis* belongs mainly to the xerophytic type of the Mediterranean region. It comprises seven species, all herbaceous, two of which, *M. perennis* Linné and *M. annua* Linné, occur in Britain. The latter, formerly known as *French Mercury*, is a doubtful native, occurring generally as a weed in gardens; but, though it is necessarily dependent upon seed-production for its continued existence, since it is apparently capable of producing seed parthenogenetically, *i.e.* without fertilisation, it may well maintain itself. It has been employed as a boiled vegetable, the discovery of its wholesomeness being ascribed to the god Mercury, whence the genus derives its name. Compared to it, however, and to the so-called *English Mercury* (*Chenopodium Bonus-Henricus* Linné), the poisonous Dog's Mercury is, as the prefix *Dog's* suggests, of no value. The Germans, in fact, sometimes call it *Böse Heinrich* (Wicked Henry) in contradistinction to the Chenopod *Guter Heinrich*. None of the genus has the milky latex of the Spurges, in which character they resemble the closely allied genus *Ricinus*, the Castor-oil plants.

Being a perennial, the Dog's Mercury is able to propagate itself largely by its slender, branching rhizomes, by means of which it becomes "social." The branches



DOG'S MERCURY—continued.

of the rhizome rise as erect, unbranched, aerial shoots about a foot high, bearing shortly-stalked leaves in opposite pairs, increasing in size upwards to a length of three inches each. The leaves have a crenate margin and the delicate texture characteristic of shade plants, so that they wilt rapidly if gathered. The flowers are diœcious, though occasional male flowers occur on the female plants; and, while the scanty nectar of the Spurges suffices to attract flies for their pollination, here there is no honey and pollination is entirely effected by wind. The staminate flowers are sub-sessile, in racemes on long peduncles, so that they are fairly conspicuous, though each flower consists merely of three minute sepals and from eight to twenty stamens with slender but erect filaments. The female flowers are borne singly, or two or three together, on shorter spikes much concealed by the leaves, and consist of three sepals and two carpels united below, with two long recurved styles.

The fruit is hairy externally and its inner lining consists of oblique lignified fibres forming a cartilaginous layer, the contraction of which results in the valves of the carpels opening outward and discharging the seeds, of which there is only one in each carpel. There is not the explosiveness here that is exhibited by some other members of the Family. The schizocarp of *Hevea brasiliensis* Müller, for example, the Pará Rubber-tree, explodes like a pistol-shot, as also does that of the Sandbox-tree (*Hura crepitans* Linné), another native of the forests of Tropical America.

CLVII.—THE BOX.

Buxus sempervirens Linné.

THE small Family *Buxaceæ* has generally been treated merely as a sub-division of the *Euphorbiaceæ*; but, though they have the unisexual, apetalous flowers, and the three united carpels forming an explosive fruit, characteristic of that Family, the raphe is dorsal. They are evergreen trees or shrubs with exstipulate leathery leaves and a watery juice, belonging mostly to the warmer regions of the Old World.

The genus *Buxus* includes fewer than twenty species, with monœcious flowers which secrete some honey, though they are largely pollinated by wind. These flowers are small and are crowded together in cymose clusters with a central female blossom surrounded by a number of staminate ones.

The Common Box (*B. sempervirens* Linné) occurs over most of the Palæarctic Region; and, although it only appears wild at the present day in a very few localities in our southern counties, there is no great reason to doubt its indigenous character. The name Boxmoor in Hertfordshire was probably originally Bogsmoor, thus having nothing to do with this tree; but Boxley in Kent and Boxhill in Surrey may well be named from it. Though the name *Box* is represented by very similar forms in Celtic and Slavonic languages, these may be only loan-words from the Latin. The hard, compact, and even-grained yellow wood, the only European wood that will not float in water, was known at an early date as being, in the words of Dryden's Virgil:—

“Smooth-grained, and proper for the turner's trade,
Which curious hands may carve, and steel with ease invade.”

Its Greek name πύξος, *puxos*, gave rise to words signifying a small box turned from its wood, of which we retain the word “pyx” as well as “box”; and both Virgil and Ovid refer to its use among the Romans for the manufacture of musical instruments, using, in fact, the word *buxus* for a flute. Pliny and Vitruvius allude also to the use of the shrub in the formal “topiary” work, or clipped garden hedges, of which their contemporaries were fond; and sprigs of Box were, no doubt, employed in weaving festal garlands at their banquets. This may be the explanation of the many well-preserved branches, obtained from the wells at Silchester, the ancient Calleva, which can be seen in the Museum at Reading.

A considerable proportion of the boxwood of modern commerce, shipped from Odessa and Constantinople, is the produce of a larger-growing species, *Buxus balearica* Lamarck; but there is no reason to suspect that the large number of Box-trees growing with other trees in the Pyrenees, at St. Claude in the Jura, and in the Forest of Ligny, are the result of Roman introduction. In Britain, however, the tree may well have had this origin, since the earliest references to it known to us are the names of Adam and Henry de Buxeto, *i.e.* of the Box-grove, in Surrey charters of the reigns of John and Henry III. There is much to be said in favour of the threefold test of



THE BOX—continued.

the truly indigenous character of trees put forward by Daines Barrington in the eighteenth century, viz. that they grow in large masses, spreading over a considerable area, that such masses never end abruptly save where there is a sudden change of soil, and that the seed ripens and germinates freely. Tried by these tests, we can hardly claim that the Box is truly indigenous in England.

The Box is a very slow-growing tree, of great longevity, its shoots seldom exceeding six or eight inches of annual length or its diameter increasing more than an inch in ten years. In this country it is seldom seen more than twelve or fifteen feet high or with its grey stems more than six or eight inches through. The twigs are four-angled, and the leaves in opposite and decussate pairs, though often twisted into a single plane or spray. When young they are of a bright grass-green, so that Herrick, in his verses for Candlemas Eve, writes :—

“ Down with the Rosemary and Bayes ;
Down with the Mistleto ;
Instead of Holly, now upraise
The greener Box for show ” ;

and goes on to speak of it as “youthful” till Easter.

A thickened cuticle with four rows of “palisade cells” beneath give the leaves their leathery texture and dark colour when mature : the sunken position of their stomata serves to check transpiration while they persist through the winter season of cold soil and torpid root-action ; and the highly polished surface is useful in preventing snow from remaining long upon them.

The little pale yellow clusters of flowers appear in the axils of the leaves in April and May. They form a pair of *glomerules* or sessile axillary cymes, the central flower in each cluster being, as in *Euphorbia*, female, and the others, developed a little later and staminate. In addition to minute bracts, each flower has a calyx, consisting in the staminate flowers of two alternating pairs of sepals, and in the female flowers of six, nine, or twelve, in alternating whorls of three. The male flowers have four stamens with long filaments and a quantity of the dry, dust-like pollen characteristic of anemophilous plants ; but there is some honey and bees visit the flowers both for it and for pollen. The gynæceum in the female flowers consists of three carpels united below into a three-chambered ovary but with three distinct spreading styles. This ripens to a dry capsule about half an inch long, which splits explosively into three valves, each formed of two adherent half-carpels, so that each of the stylar horns splits longitudinally. There are two black seeds in each chamber, and these are hurled to some distance.

CLVIII.—THE WATER STARWORT.

Callitriche palustris Linné.

IF the affinities of apetalous Families of plants are difficult to trace, those of many groups of apetalous aquatic plants are even more so. The chief interest, in fact, which aquatic plants have for the physiologist is their illustration of the production of resemblances in general habit, or in the form and structure of the vegetative organs, of plants of the most varied ancestry, by the action of closely similar conditions of life. Though belonging to many Orders widely divergent in their affinities, as indicated more or less by their reproductive organs, aquatic plants thus form what is termed a *biological group*.

Its high specific and latent heats render water so much slower than air to change its temperature that aquatic plants are but little liable to have their growth or their diffusion checked by such changes. They are thus mostly perennials and of very wide distribution, at least within the same zone of temperature. Their perennial habit makes those of Temperate latitudes where frost occurs require some method of hibernation ; and the Water Starworts (*Callitriche*) are among the few which remain unaltered and do not sink to the bottom before the winter. Water, again, offers considerable obstruction to the transmission of light ; and more or less submerged plants have accordingly the long internodes and the thin leaves with green colouring-matter in their surface-cells which are characteristic of shade plants. It is probably mainly the demand for light that brings about the ribbon-like elongation of some submerged leaves ; and the presence of a dense rosette of floating leaves will obviously intensify the shade effect. It is interesting to note in *Callitriche* that the submerged leaves are longer and narrower the deeper they are below the surface.

Aquatic Flowering Plants, however, show themselves to be derived from land forms by the fact that, except in a very few cases, they do not flower under water ; nor is their pollen often specially adapted for conveyance by water. When we find a whole genus or Family possessing the aquatic habit we conclude that it is of more ancient origin than where—as in *Ranunculus*—only some species have it ; and it is especially in these cases that the affinities of the groups are so difficult to trace.

The Family *Callitrichaceæ* contains only the one genus *Callitriche*, so named by Pliny (from the Greek *καλός*, *kalos*, beautiful, and *θρίξ*, *thrix*, hair) with reference to its slender hair-like stems, or, perhaps, to the silvery, colourless, and transparent roots which descend from their nodes. Some twenty-five species have been described ; but it is difficult to avoid the conclusion that the plants vary much under the influence of slightly differing conditions, so that the real number of species is much smaller. Thus eight British forms have been named, including those inhabiting mud, deep lakes, and shallow ponds ; and one of the most marked distinctions between them is the presence of a rosette of floating leaves, or its absence.



THE WATER STARWORT—continued.

A superficial resemblance to some of the Chickweeds has given *Callitriche* the popular name of *Water Chickweed* and suggested an affinity with the *Caryophyllaceæ*. Bentham and Hooker placed the group with the Mare's-tails (*Hippuris*) and Water Milfoils (*Myriophyllum*), the British members of the Family *Haloragidaceæ*; but though these have opposite or whorled exstipulate leaves and minute flowers, their inferior ovary would seem sufficient to separate them from the Water Starworts. Again, the fruit in the plants now under consideration, consisting as it does of two carpels which become divided into four one-seeded chambers by the ingrowth of the two midribs, has naturally suggested relationship with *Verbenaceæ* or *Boraginaceæ*. The pendulous, anatropous ovule, however, with a ventral raphe, has made Engler, Eichler, and Warming agree in placing *Callitrichaceæ* near to *Euphorbiaceæ*.

In *Callitriche palustris* Linné, but not in *C. autumnalis* Linné, the rare deep-water form, the surface is covered with minute scattered, stellate hairs or scales which give a glistening appearance to the plant. The minute axillary flowers are generally unisexual and monœcious, the stamens being the only part of *C. palustris* to be above water; but occasionally the staminate flowers contain ovaries. There is no perianth; but in *C. palustris* there is a pair of colourless, incurved, horn-like bracts below each flower. The staminate flower consists of a single stamen with a long, erect filament and a kidney-shaped anther, two-chambered below, but one-chambered above, which dehisces transversely. The pollen-grains have no outer coat, which renders them lighter than water and probably facilitates the actual fertilisation. The female flower is sometimes produced in an axil opposite to one bearing a staminate one; but it is very often under water. It consists of a four-lobed ovary, sometimes shortly stalked, with two slender styles of considerable length, which become stigmatiferous throughout their length. The styles vary much in direction, being either erect, ascending, or reflexed. The late Lord Avebury suggested that "the pollen is probably in some cases carried by insects, in others by wind, and sometimes by water."

The fruit varies considerably in the different forms or species, its four lobes being blunt, keeled, or winged down their backs. That of *C. palustris* is sessile, with swollen, bluntly keeled lobes. In all cases it ultimately breaks into four indehiscent one-seeded mericarps.

Although Gerard, with a utilitarian mental attitude, styles the Water Starwort "an herbe of small reckoning," its bright green rosettes on the surface of a clear pool or spring are an attractive reminder of the useful work it has performed in oxygenating the water in which it grows.

CLIX.—THE HOLLY.

Ilex Aquifolium Linné.

THE Order *Sapindales*, taking its name from the soapy seeds of some of its representatives, is, as understood by Engler, only a little less extensive than the nearly related *Geraniales*. It includes a large number of arborescent plants, mostly with polysymmetric flowers having a distinct calyx and corolla, comprising, according to him, among British Families, the *Buxaceæ*, *Empetraceæ*, *Aquifoliaceæ*, *Celastraceæ*, *Aceraceæ*, and *Balsaminaceæ*. The main characters that these have in common are those of the ovule, which is either pendulous with a dorsal raphe and upward-facing micropyle, or ascending with a ventral raphe and micropyle facing downward. We have already dealt with the *Buxaceæ*; and the little Crowberry (*Empetrum nigrum* Linné), with inrolled leaves and black edible berries, is not represented here. It differs from the Holly Family (*Aquifoliaceæ*) chiefly in having the parts of its flower in whorls of three, instead of in fours or fives.

The *Aquifoliaceæ* comprises five genera and 180 species of shrubs and trees with scattered, minutely stipulate, leathery, simple leaves, a cymose inflorescence, mostly diœcious flowers, and a drupaceous fruit containing several endocarps or one-seeded “stones.” The Family is largely American; but *Ilex*, the chief genus, which includes 170 species, is widely spread in Tropical and Temperate regions.

No one has ever doubted the indigenous character of our British Holly (*Ilex Aquifolium* Linné). It forms a conspicuous portion of the undergrowth in all our most primitive forests. On the poor sandy soil of the old Kingswood, which we now know as the Bristol coalfield, it flourished so luxuriantly that the chatty Aubrey suggests that it derived benefit “from the effluvia of that mineral.” It was in Epping Forest that it excited the admiration of Peter Kalm, the pupil of Linnæus, who visited England in 1748; and in the Forest of Dean ancient Hollies surround the Speech House, a meeting-place of great antiquity; and, a century ago, oaths were sworn in the Verderer’s court there held on a bough of Holly, instead of on a Testament. It is stated that Holly will not grow more than a hundred miles from the sea, which may, perhaps, mean that, like the Cherry-laurel, it cannot withstand the “continental” severity of the winter in such places.

There are, as might be expected, many allusions in English poetry to the bright green of the leaves and the crimson of the berries; and many of the popular superstitions connected with this tree and the Christmas season are probably ancient and are, therefore, confirmatory evidence of the antiquity of the tree in the country.

It is a slow-growing tree and produces a hard-grained, ivory-white wood, valued for turnery and inlaying and especially for staining. The “ebonized” handles of tea-pots are commonly made of this wood.

The smooth, matt-silver bark of the stem, contrasting with the light green twigs and young leaves of spring, the dark glossy foliage of the later season, and



THE HOLLY—continued.

the bright berries lasting through winter, gives the tree its individual charm. After his tenant, Peter the Great, had amused himself by trundling a wheelbarrow through the Holly hedge at Deptford, John Evelyn writes in his "Sylva" (1662) :—

"Is there under the heavens any more glorious and refreshing object than an impregnable hedge of about four hundred feet in length, nine feet high, and five in diameter, which I can still show at any time of the year in my ruined garden at Sayes Court (thanks to the Czar of Muscovy), glittering with its armed and vernished leaves blushing with their natural corale? It mocks the rudest assaults of the weather, beasts, and hedge breakers."

The name *Holly* probably referred originally to the spinous leaves, being connected with the root *hul-* or *cul-*, as in the Latin *culmen*, a peak; while what is now its specific name, *Aquifolium*, means "needle-leaved." William Turner, in his "Libellus de re Herbaria" (1538), says that the French call it *housum*, the English "an holy tre" and "an Hulvar tre," adding that, when a boy, he had made bird-lime from its bark. The old French *houlx* is now *houx*; and *hulver* lingers in use in our eastern counties, though it is mostly under the form *holm* that the name enters into those of places, such as Holmesdale and Holmwood. It is easy to understand how the name was taken to mean "holy"; and how the old pagan use of the evergreen boughs for winter house-decoration became transformed into a Christian symbolism, which sees in the blood-red berries and thorny leaves a foreshadowing of the Passion at the celebration of the Nativity.

Southey's poem has popularised the fact that the lower leaves are well armed, being so twisted as to present spines in every direction,

"But as they grow where nothing is to fear,
Smooth and unarm'd the pointless leaves appear."

There remains, however, one point to the upper leaves, and the spines of the lower ones do not serve to protect them from deer. Lord Avebury suggests that the twisting, which produces an absence of flat surfaces, may, like the glossiness, be a protection against snow.

The clusters of small, wax-like, white, or pink-tinged flowers, which are produced from May to October, are peculiarly attractive to bees. They have some easily accessible honey; and, as the tree is almost diœcious, it is dependent upon these insect visits for its pollination. Perfect flowers do occur; but large aborted stamens in the female blossoms are often mistaken for pollen-bearing ones. It has been alleged that staminate trees become female with age.

The polished berries are, in rare cases, yellow, white, or black. Though eaten, with impunity but with no great eagerness, by birds, they are so powerfully emetic and purgative as to be regarded as poisonous to man. The leaves contain a bitter principle known as *ilicin*, and were formerly used medicinally in cases of fever and rheumatism. They are used as tea by the charcoal-burners in the Black Forest; whilst those of the congeneric *Ilex paraguayensis* of South America are the *yerba de maté*, or Paraguay tea, so popular on the eastern side of that continent. Its alkaloid is allied to, or identical with, that of Tea.

CLX.—THE SPINDLE-TREE.

Euonymus europæus Linné.

ALREADY by no means a common tree, the Spindle-tree is, by its very beauty, in some danger of being rendered yet more rare. It is the sole British representative of the Family *Celastraceæ*, a small group of trees and shrubs related to the Hollies, and, more remotely, to the Maples and Horse-chestnuts, and confined mainly to the Northern Hemisphere.

The Family is characterised by its simple, undivided leaves; by its small flowers with the parts in alternating whorls, with only a single whorl of stamens, and with one or two ovules in each of the chambers formed by its united carpels; and by the fleshy disk in which the base of these carpels is sunk. More striking features are that the seeds each become wrapped round by a fleshy outer coat or "aril"; and that the cotyledons or embryonic leaves are very generally already green whilst still within the seed.

The name *Euonymus*, which dates from Theophrastus in the fourth century B.C., signifies "well-named" or "lucky"; but arises from the poisonous character of the plant. As the Irish peasant euphemistically speaks of the fairies as "the good people" because he is afraid of them, so the Greeks called their avenging deities, or Furies, the Eumenides or "kind folk," and their mother Euonyme, "she whose name is good." Such popular names as "Spindle-tree" and "Prick-wood," and the French *Fusain* and *Bois-à-lardoire*, refer to the former use of its tough wood for making spindles and skewers; whilst the French *Bonnet de Prêtre* and the Flemish *Kardinaalsmuts* are apt allusions to the biretta-like shape and striking colour of the fruit.

In Forfarshire there was formerly a considerable quantity of this species, which sometimes attained a considerable size, with trunks upwards of a foot in diameter. Its close-grained wood was then in considerable demand for turnery, being used, with that of the Alpine Laburnum (*Cytisus alpinus*), for the staves, alternately yellowish-white and dark brown, of the little cups, known as "bickers" or "luggies," used for porridge or as drinking-vessels. Now, however, Holly-wood is generally substituted for that of the Spindle-tree. The freedom of the latter from any tendency to splinter made it suitable also for knitting-needles, whilst watchmakers can pare it down for the finest pegs they require in their work; and its fine-grained charcoal is esteemed on the Continent for artists' crayons.

The Spindle-tree is most commonly seen as a hedgerow shrub, the vivid matt-green of its smooth shoots, with their opposite pairs of glossy leaves drawn out into graceful points, rendering it conspicuous even in spring and summer. The tree is somewhat exceptional in retaining the greenness of its shoots for several years, as it does not form opaque brown cork beneath the surface of the stem at as early a stage as do most woody plants. The predominance of the number four in



THE SPINDLE-TREE—continued.

the structure of this plant is seen in the four-angled or four-winged character of the shoots, and even of their buds, as well as in the parts of the inconspicuous little greenish flowers, which appear in May and June. Twigs and leaves are alike bitter in taste, give off a fetid odour if bruised, and contain an irritant poison known as euonymin.

Produced in stalked clusters, generally of three together, the pale blossoms are individually less than half an inch across; but it will be at once noticed that all their parts are in fours: four sepals, four petals, four stamens at the margin of the relatively large fleshy disk, and four carpels. In some of the flowers the stamens, and in others the stigmas, are functionless; and, when both are functional, the stamens discharge their pollen before the stigmas are ready to receive it. Cross-pollination, which is thus necessary for seed-production, is effected by the many flies which visit the blossoms, attracted by the abundant honey poured out on the fleshy disk, and, perhaps, by some fetid odour perceptible to their delicate sense of smell.

It is in autumn, however, that the Spindle-tree is most attractive to us. The leaves then turn to crimson and yellow, the two colours blending in every conceivable manner even on the same leaf, while the veins or other parts may retain some of their original green, or decay to russet-brown. Then too

“the fruit
Which in our winter woodland looks a flower,”

which Tennyson wished the wisdom of his maturity might resemble, presents us with one of the most daring of Nature's colour-contrasts. The slightly fleshy, biretta-like pericarp becomes a rosy red, or more rarely a creamy white, resembling a cross, with the smooth rounded outlines and the colour of coral or of ivory; and then, bursting, discloses the seeds each covered with the now orange-scarlet aril, which exists solely, it would seem, to attract birds, so that the seeds may be disseminated. Thus we appear to have, side by side, a display of those brilliant but seemingly purposeless colours which accompany the chemical changes of decay, and another, appealing equally to man's sense of the beautiful but subservient to a very obvious purpose in the economy of the plant.

There are several varieties in cultivation, with dark purple, silver-variegated or gold-variegated foliage. These are commonly grafted on the common wild form.

CLXI.—THE HEDGE MAPLE.

Acer campestre Linné.

THE Common, Hedge, or Field Maple (*Acer campestre* Linné) is the only truly indigenous representative of the genus *Acer* and of the Family *Aceraceæ* in our islands. Its congener the Sycamore (*Acer Pseudoplatanus* Linné) is, it is true, a very common tree ; but it has not been introduced for more than a few centuries.

The Family *Aceraceæ* comprises three genera and about a hundred species, most of the hundred belonging to the genus *Acer*. Though we associate the beautifully varied autumnal tints of Maple leaves chiefly with the dry continental heat and cold of North America, a large proportion of the species are natives of that part of Asia which lies between Japan and the Himalaya. Maples at the present day are, in fact, essentially natives of the North Temperate Zone ; but well-preserved fossil remains of the group occur in the Brown-coal beds of Dakota, slightly more modern than our Chalk, and in the Swiss Miocene deposits.

They are all trees or shrubs, with opposite, exstipulate leaves ; polysymmetric flowers, generally green or inconspicuous ; and two, or three, carpels united into a superior schizocarp and each furnished with a wing and containing two ovules, only one of which usually becomes a seed. There are generally five sepals, five petals, and eight stamens in two whorls, inserted upon a prominent ring-shaped but lobed honey-secreting disk. All Maples have three principal veins or ribs in the leaf, radiating in a palmate manner from the apex of the petiole, and in most cases the leaf-blade is correspondingly lobed. In his usefully suggestive "Manual and Dictionary of Flowering Plants," Dr. J. C. Willis writes :—

"An interesting exercise is to go through a collection of Acers in a herbarium or elsewhere, comparing the leaf-tips as to degree of development of the acuminate 'drip-tips,' noting at the same time the kind of climate from which each specimen has come. It will be easily seen that there is a good general correlation between the length of the tip and the wetness of the climate."

By this criterion our Hedge Maple would seem to belong to dry conditions ; for the characteristic outline of its leaves, which are from an inch and a half to two inches across, is five slightly-notched, obtuse lobes, radiating from a broad, slightly-cordate base, with blunt sinuses between them. Their slender stalks, upwards of an inch in length, are crimson, and when young the leaves themselves are downy. As they become smooth they assume a brownish or yellowish shade of green ; and in a favourable autumn the tree will, as Tennyson put it, "burn itself away," in lemon-yellow or dead-gold.

The branches spread somewhat horizontally ; and, when isolated and thus well grown, the tree assumes a compact, rounded head, not unlike that of the larger Sycamore. The bark is smooth at first, but soon becomes brown and rough, splitting into longitudinal corky wings. The young shoots yield a white milky latex, which contains sugar, though not to the same extent as does that of some



THE HEDGE MAPLE—continued.

North American species. It is this which gives them, when gathered green and dried, some value as winter provender for cattle.

The three most distinctive characters of the species are the form of the leaves, the erect flower-clusters, and the direction and shape of the wings of the fruit. The inflorescences terminate the young shoots of the year, the flowers opening in a racemose or sub-corymbose sequence. Peduncles, sepals, anthers, and ovaries are alike downy, so as often to appear as if thickly covered with dust ; and, inconspicuous among the young leaves in May and June, the flowers are, in spite of their honey, but little visited by insects. The lower flowers in the cluster are male, producing perfectly functional stamens, but only the rudiment of an ovary. Those terminating the cluster may be functionally female, having anthers which do not mature, or perfectly bisexual, in which case they are sometimes protandrous. Pollination seems to be commonly effected by wind, but sometimes by flies and occasionally autogamously, *i.e.* by the pollen of the same flower.

The hairy ovary at an early stage of its development shows signs of the wings that are to grow from the side of each carpel. Of these, though two is the usual number, three not uncommonly occur. The wings grow out like the two blades of a screw-propeller, and the study of their outlines and relative positions in the various species of the genus has proved of service to the marine engineer. In our species, however, the propeller seems of a somewhat primitive, *i.e.* unelaborated, type, its wings spreading in one horizontal line and each having a simple, oblong outline. When, in October, the fruit is ripe, and is torn off by wind, the propeller does not spin so readily, as it falls to the ground, as does the more specialised structure in the Sycamore ; and consequently does not so readily secure the dispersal of the fruit horizontally, away from the shadow of the parent tree, by the lightest of breezes. While the wings become glabrous, the attached seed-containing carpel may either remain downy, in which case the variety has been named *A. campestre*, var. *hebecarpum* De Candolle, or become glabrous, when it is the var. *leiocarpum* of Wallroth : the former is certainly the more frequent.

The seed is exalbuminous, and the strap-shaped cotyledons are rolled up and already green within the brown fruit ; but their germination is often much delayed.

The leaves of the Maples in our hedgerows often exhibit various diseases : they may be spotted with black by the attacks of one fungus, or hoary, as if covered with powdered chalk, by the action of another ; thickly studded with red galls produced by a mite, or glazed with the honey-dew resulting from aphides.

CLXII.—THE ALDER BUCKTHORN.

Rhamnus Frangula Linné.

THE Family *Rhamnaceæ*, with the *Vitaceæ*, the Grapes, Virginian Creepers, etc.—a Family not represented among British plants—constitutes the Order *Rhamnales*. They are shrubs or small trees, some of them twining or climbing, and others, such as our Common Buckthorn (*Rhamnus catharticus* Linné), with spine-terminated branches. Their leaves are stipulate, simple, and entire; the inflorescence cymose; and the flowers inconspicuous and polysymmetric, but secreting honey, often massed together, and pollinated by insects.

The number of parts in each of the floral whorls is often reduced to four, as in the Spindle-tree and its allies; but the *Rhamnaceæ* differ from the *Celastraceæ* in having valvate, instead of imbricate, sepals, and stamens opposite to, instead of alternating with, their petals. In the *Rhamnaceæ* there is a cup-shaped receptacular tube, from the inner surface of which the honey is secreted, whilst the petals and stamens spring from its margin. The fruit, though dry and dehiscent in some members of the Family, is, in the Buckthorns and many others, fleshy and drupaceous, much as in the Holly, enclosing three, or less commonly two or four, one-seeded endocarps or “stones.”

It is the fleshy portion of the berries of the Buckthorns that yields the various colouring substances which constitute one of the chief economic products of the group; while fruit, bark, and, to some extent, the whole plant, contain bitter, and sometimes astringent, principles, often strongly purgative and employed as such medicinally. Thus a Mediterranean species, *Rhamnus infectorius* Linné, is much grown at Kaisaryeh in Asia Minor, the ancient Cæsarea in Cappadocia; and its unripe fruits are exported from Smyrna under the name of Persian or Yellow Berries. Other species, such as *R. saxatilis* Linné, *R. Alaternus* Linné, and *R. oleoides* Linné, from the Mediterranean area, and our British *R. catharticus* Linné, yield some of the berries of commerce, those from France, known as Avignon Berries, being considered inferior to the Asiatic. They are used to give a yellow colour to morocco leather. The ripe berries of the British and Asiatic species alike, with the addition of alum or lime-water and gum arabic, form the sap-green or bladder-green of painters. Rather more than half a century ago considerable quantities of a beautiful green dye known as Lo-kao, or Chinese Green Indigo, were imported from China to Lyons for dyeing silk, and proved to be extracted from the bark of *R. chlorophora* Decaisne and *R. utilis* Decaisne. A similar dye has been obtained from our own *R. catharticus*; but both are now alike superseded by aniline colours. Ripe Buckthorn berries are collected in Hertfordshire, Buckinghamshire, and Oxfordshire partly for the manufacture of sap-green and partly for that of the purgative Syrup of Buckthorn; but, owing to the violence and uncertainty of its action, this latter substance has now been superseded by the so-called Cascara sagrada, or “Sacred



THE ALDER BUCKTHORN—continued.

bark," the inner bark of *R. Purshianus* De Candolle, a native of the Pacific slope of North America, more especially Oregon.

The name *Buckthorn* is merely an early mistranslation of the German *Buxdorn*, i.e. the thorn-bearing Box ; but *Rhamnus*, or rather its Greek equivalent *ῥάμνος*, *rhamnos*, dates from Theophrastus. Our two British species belong to distinct Sub-genera or Sections. In the one, *Eurhamnus*, to which *R. catharticus* belongs, the flowers are usually tetramerous and diœcious : in the other, *Frangula*, they are pentamerous and perfect. While *R. catharticus* is a stiff, much-branched, spinous shrub, growing upon calcareous soil, *R. Frangula* is unarmed, has a far looser habit of growth, with slender branches, and flourishes on clay or wet alluvial soils.

The name *Frangula*, used by Matthioli, is derived from the Latin *frango*, I break, the twigs being considered brittle ; while, growing, as it often does, side by side with the Alder, slightly resembling it in leaf and at once distinguished by its berries, it was also known as *Alnus nigra baccifera* or *Black Berry-bearing Alder*, *Aller*, or, in Lancashire, *Owler*. Its soft, spongy, yellowish wood is largely used, under the name of *Black Dogwood*, in the manufacture of gunpowder charcoal. The leaves are the chief food of the caterpillar of the beautiful Brimstone Butterfly (*Gonepteryx rhamni*). The twigs are slightly angular, tinged with a violet colour, marked with small half-moon-shaped leaf-scars, each with three terminations of veins, and with numerous whitish lenticels or cork-warts, and bearing small grey hairy buds without bud-scales. The small round berries only contain two stones, and turn from a polished vivid green to bright red and ultimately to black, whilst those of *R. catharticus* pass at once from green to black and contain four stones.

CLXIII.—THE BROAD-LEAVED LINDEN.

Tilia platyphyllos Scopoli.

THE Order *Malvales* is one of those natural groups upon which systematists are in agreement. It includes two Families represented in the British flora, the *Tiliaceæ* and the *Malvaceæ*, which agree in having polysymmetric, complete, pentamerous, and usually perfect flowers, with valvate sepals, and two or more united carpels with their ovules on their inner or central margins and anatropous. The Family *Tiliaceæ* comprises some forty genera and less than four hundred species, largely Tropical and mostly woody. They have scattered, stipulate leaves, which in the trees of the Family are generally arranged on horizontally-spreading sprays, so twisted at their bases as to lie in one plane and so wonderfully dovetailed together without overlapping as to form a "mosaic," exposing the maximum of their surfaces to light and air. The leaves are frequently oblique or unsymmetrical at the bases of their blades, as they are in the Lindens, the smaller of their two auricles being on the side next the branch, this character resulting mechanically from this side being innermost in the bud. The flowers are arranged in cymes, are protandrous, and secrete honey : they have usually an indefinite number of stamens, each bearing a perfect two-chambered anther ; and the seeds are albuminous and have well-developed leafy cotyledons.

The genus *Tilia* being confined to northern Asia, parts of Europe, and North America would probably not have been known to the primitive Aryan race in their ancestral home in the uplands of Central Asia, so that their descendants have no common name for it. It was the *φιλύρα*, *philura*, of the Greeks, whilst the Latin *Tilia* has given us the Portuguese *Til*, Spanish *Tilo*, Italian *Tiglio*, and French *Tilleul* ; and the Teuton—perhaps reminded by its tough bast, or inner bark of the fibre of the "lin," or "lint," *i.e.* the flax (*Linum*)—named it *Lintia* or *Linde*, which appears as *Lind* in Danish, as *Linn* in Swedish, as *Line* in Old English—in the fourth and fifth acts of "The Tempest," for example—and, perhaps, in the Russian *Lipa*. Our modern English *Lime* is merely a corruption of *Line* ; whilst to the American these beautiful trees are merely *Basswoods*.

Botanists must ever look with reverence upon this group of trees ; for whether or not a meadow encircled by a hedgerow of Lindens gave the family name to our own great botanist John Lindley, it is certain that a Linden growing near the home of his ancestors furnished a cognomen to a far greater than Lindley—the immortal Carl von Linné, better known as Linnæus.

To the ancients, the Lindens seem to have appealed mainly by their utility. Greek ladies and effeminate men used the light wood for purposes to which whalebone has been applied in modern times : Virgil refers to its employment, also on account of its lightness, for the yoke of the plough-ox ; and Pliny to the



THE BROAD-LEAVED LINDEN—continued.

use of the bast or *liber* for tying garlands, or for paper—a use that has given us the word “library.”

Apart, however, from associations and utilitarian considerations, the Lindens have beauty and scientific interest sufficient to command attention. They are tall, straight-stemmed trees, with smooth bark, either round-headed or, when more perfectly developed, draped in equal drooping boughs from the ground to their summits eighty or ninety feet up, so as to present a grand columnar aspect. The four rows of fine trees which give the name Unter den Linden to one of the finest streets in Berlin, though of world-wide fame, are not equal to the avenue, over a mile in length, at Herrenhausen, in Hanover. At Ken Wood, Hampstead, there are specimens of unusual height; and at Dromana, in County Waterford, is a magnificent avenue; but one of the most beautiful is that of Trinity College, Oxford, where the bare boughs in winter form a perfect Gothic arcade like some cathedral aisle. One of the charms of such an avenue is the wreath of adventitious shoots encircling the base of the trunk—a wreath of coral branchlets as they sparkle in the faint sunlight of spring, a wreath of verdure in summer, and a wreath of gold in autumn.

The Small-leaved Linden (*Tilia cordata* Miller), the only species which is even possibly indigenous in England, has smooth, yellowish-brown twigs; the Broad-leaved (*T. platyphyllos* Scopoli) has them downy; and its variety, *T. rubra* Lindley, has them reddish-brown; but all alike are “ruby-budded,” throwing off their brilliant red stipules as the delicate green leaves unfold into a vertical drooping in May. Their bright greenery at that season naturally suggested cheerfulness to Chaucer when he wrote:—“Be ay of chere as light as lefe on Linde.” On the under surfaces of the leaves there are, at the branching of the veins, woolly tufts of hair which, it is suggested by Lundström, are *domatia*, or homes, for mites, which are supposed to be useful to the tree by eating the spores of fungi that fall upon the leaves.

The inconspicuous, greenish-yellow blossoms hang down in June and July in clusters, the stalk of which is adherent to the remarkable, large, buff-tinted, membranous bract. Their delicious perfume, which is said to increase in power as it diffuses through the air, and their copious stores of nectar, render them as attractive to bees as the most gaily-coloured flowers; and an excellent class of pale-coloured honey is manufactured by the bees that visit these trees.

The adherent bract may be of some assistance in the dispersal of the bunch of top-shaped, five-angled, downy fruits; but, in this country, the Lindens seldom ripen their seed; so that to see the palmately five-lobed cotyledons it is better to cultivate imported seed.

CLXIV.—ANALYTICAL DRAWINGS OF
THE SPURGE, BOX, WATER STARWORT, HOLLY,
SPINDLE-TREE, MAPLE, BUCKTHORN, AND
LINDEN FAMILIES.

(*Euphorbiaceæ*, *Buxaceæ*, *Callitrichaceæ*, *Aquifoliaceæ*, *Celastraceæ*,
Aceraceæ, *Rhamnaceæ*, and *Tiliaceæ*.)

THE nine plants of which analyses are given on this Plate belong to eight different Families, the first two lines of figures illustrating the Spurge Family (*Euphorbiaceæ*).

The former of these represents the Wood Spurge (*Euphorbia amygdaloides* Linné), Fig. 1 being a cyathium seen laterally, with one staminate, and the long-stalked female flower ; Fig. 2, the same seen from above and enlarged, showing the four crescentic glands ; Fig. 3, the fruit, seen from above, about natural size, when fully developed ; Fig. 4, the withered cyathium and enlarging female flower ; Fig. 5, the ovary (female flower), further developed ; and Fig. 6, the same in section.

The second line represents the Dog's Mercury (*Mercurialis perennis* Linné), Fig. 1 showing the staminate or male flower from above, enlarged, with three sepals having incurved points and a number of stamens ; Fig. 2, a female flower, from another plant, the species being usually diœcious ; Fig. 3, the male flower, natural size ; Fig. 4, the style and axis from which the two carpels separate in the female flower ; Fig. 5, a fruit, natural size ; Fig. 6, the same, showing its partial dehiscence ; Fig. 7, a longitudinal, and Fig. 8, a transverse, section through the same.

In the third line of figures we have the details of our one species in the *Buxaceæ*, the Box (*Buxus sempervirens* Linné), Fig. 1 being a staminate flower, seen from above ; Fig. 2, a stamen ; Fig. 3, the perianth, or calyx, and some stamens seen from the side ; Fig. 4, the same, enlarged ; Fig. 5, a carpellate flower ; and Fig. 6, a transverse section of the three-chambered, six-seeded ovary.

The fourth line represents the structure of the Water Starwort (*Callitriche palustris* Linné), a much reduced type of flower. Fig. 1 is a staminate flower, consisting of a single stamen with two colourless bracteoles, and the reflexed foliage-leaves ; Fig. 2, a female flower, shortly stalked, of two united carpels with long, erect, stigmatiferous styles ; Fig. 3, the unripe four-winged fruit, enlarged ; Fig. 4, a ripe fruit, partly seen in transverse section ; and Fig. 5, a longitudinal section. The two carpels are so inrolled as to form a four-chambered ovary with a seed in each chamber, and the distinctions between the species depend largely upon the keels or wings to the fruit.

The fifth line gives the details of the Holly (*Ilex Aquifolium* Linné), another solitary British representative of its Family. Here Fig. 1 shows a staminate flower from above, natural size ; Fig. 2, the same from below ; and Fig. 3, the calyx, these



ANALYTICAL DRAWINGS OF THE SPURGE, BOX,
WATER STARWORT, HOLLY, SPINDLE-TREE, MAPLE, BUCKTHORN,
AND LINDEN FAMILIES—continued.

figures well exhibiting the tetramerous symmetry of the flower. Fig. 4 is a longitudinal section through a perfect flower, enlarged ; and Fig. 5, a transverse section, natural size, of a berry, which only shows three stones or endocarps, although four are usually present.

The Spindle-tree (*Euonymus europæus* Linné) again is the sole British representative of its Family, the *Celastraceæ*, which is even more uniformly tetramerous. Fig. 1 in the sixth line is a flower seen from above ; and Fig. 2, the same from below, both natural size. Fig. 3 is an enlarged view of the floral receptacle and essential organs from above ; Fig. 4, a side view, natural size, of a flower with its corolla removed ; Fig. 6, an unripe fruit ; Fig. 5, a longitudinal, and Fig. 7, a transverse, section through the same ; and Fig. 8, a longitudinal section through the rose-coloured pericarp of a ripe fruit, showing the scarlet arils covering two of the four seeds.

The seventh line represents the Hedge Maple (*Acer campestre* Linné), Fig. 1 being a flower seen from below ; Fig. 2, the receptacle and stamens of a male flower ; Fig. 3, a stamen, and Fig. 4, the same enlarged ; Fig. 5, a carpellate flower ; and Fig. 6, the young fruit.

The penultimate line of figures represents the Alder Buckthorn (*Rhamnus Frangula* Linné), Fig. 1 being a flower, natural size, seen from above ; Fig. 2, the same in side view ; and Fig. 3, a magnified longitudinal section, showing the pentamerous calyx which is greener than it here appears, the greenish-white petals, perigynous stamens, and superior ovary. Fig. 4 shows a trilobed unripe fruit ; Figs. 5 and 6 show the three stones ; and Fig. 7, one of them in section, exhibiting the one seed it contains.

The last line of figures represents the flower of a Linden (*Tilia*), Fig. 1 being a flower, natural size ; Fig. 2, the same in longitudinal section, magnified ; Fig. 3, the gynæceum, showing the pubescent ovary ; Fig. 4, one of the remarkable stamens with divided anther-lobes ; Fig. 5, an unripe fruit ; Fig. 6, the same in transverse section ; and Fig. 7, the same, at a later stage, slightly enlarged, showing the five chambers which ultimately become one, with two ovules in each of the original chambers, attached to a central placenta.

CLXV.—THE MARSH MALLOW.

Althæa officinalis Linné.

THE *Malvaceæ* are a Family of some seven hundred species in about thirty-five genera, natives of Tropical and Temperate regions, the number of species gradually decreasing towards the Poles. They are herbs, shrubs, or occasionally trees and all agree in being harmless, and in containing an abundance of mucilaginous juice. They also very generally form a tough *liber*, or inner bark, which in many species is of local importance for cordage and similar purposes. The leaves are scattered, stipulate, and palmately veined and lobed ; and in this and several other characters they recall the *Geraniaceæ*. In contrast to the *Tiliaceæ*, the flowers are generally conspicuous and often very large, and the calyx is persistent in the fruit and is generally furnished with an *epicalyx* or *involucre*, sometimes an internode below the flower. This has been described, like that of the Strawberries and other *Potentilleæ*, as made up of the stipules of the sepals, but is, perhaps, better explained as made up of bracts and bracteoles. While the sepals are united and valvate in æstivation, the petals are convolute, each having one edge overlapping the next. The andræcium consists typically of two whorls of stamens ; but, while the outer whorl (alternating with the petals) is usually suppressed, the inner five become, at an early stage of development, repeatedly branched both collaterally and coradially, each branch terminating in an anther differing from those of the *Tiliaceæ* in being *dimidiate* or halved, having, that is, two pollen-sacs which fuse into a single pollen-chamber. The five groups of stamens are carried up on a common tubular outgrowth from the receptacle which is so united to the bases of the petals as to make them appear gamopetalous. The carpels are superior and vary in number, being generally united in a ring or whorl, as in *Geraniaceæ*, round a more or less elongated central axis or carpophore. The placentation is central and the ovules anatropous, whilst the fruit is generally dry, and the seeds contain a curved embryo surrounded by scanty albumen.

The genus *Althæa*, to which the Marsh Mallow belongs, is distinguished by its epicalyx consisting of from six to nine united bracteoles. It comprises some fifteen species, all natives of the Old World. They are herbaceous, though often perennial and sometimes of large size ; have very generally a hairy or downy surface both to stems and leaves ; and usually have the latter lobed or divided.

What is, perhaps, the only truly indigenous British species, *Althæa officinalis* Linné, is a very beautiful plant, one of the great charms of the banks of the tidal ditches of our salt-marshes, where its tall clusters of palest blush-pink blossoms are set off by its hoary stems and leaves. It grows two or three feet high and is but little branched, its cauline leaves having short petioles and a toothed margin and being only sometimes lobed. The soft, velvety pubescence of stellate hairs forms a beautiful object under the microscope. The delicate pink blossoms, from one to



THE MARSH MALLOW—continued.

two inches in diameter, are borne in short-stalked axillary cymes, and are each followed by a fruit consisting, as in *Malva*, of a ring of indehiscent one-seeded mericarps surrounded by the persistent ovate sepals. The deep rose-coloured anthers of the numerous united stamens mature before the stigmas become receptive; and, as they wither, the circle of slender styles, equal in number to the carpels, develop a stigmatic surface down their inner surfaces.

The mucilage of the rhizome, extracted by boiling, is extensively used in France, under the name *Guimaube*, in the preparation of demulcent drinks and cough lozenges; and it was this soothing property that originated the generic name *Althæa*, which comes from the Greek ἄλθω, *altho*, I heal, just as the name *Mallow*, from the Latin *Malva* and the Greek μαλάχη, *malache*, is derived from μαλάσσω, *malasso*, I soften. The English name is variously given in Turner and other early botanical writers as *Mersmalewe*, *Mershe Mallowe*, *Marish Mallowe*, and *Moorish Mallow*. Gerard, in 1597, writes of it as growing

“very plentifully in the marshes both on the Kentish & Essex shore amongst the riuer of Thames about Woolwich, Erith, Greenehyth, Gravesend, Tilburie, Lee, Colchester, Harwich, and in most salt marshes about London”;

and there are even eighteenth-century records of its occurrence at Chelsea and at the Isle of Dogs.

Of several other species of *Althæa* grown in gardens, the most important is the Hollyhock (*A. rosea* Cavanilles), a native of China, which has been in cultivation in Britain for more than three centuries. It is a perennial rejoicing in rich, deep, well-manured loam, with plenty of water in summer and dryness in winter; and its tall stems, with their large, almost sessile, and often doubled blossoms, presenting a great range of colours, are familiar objects in every cottage garden. The beautiful flowering shrub often known as *Althæa frutex* is *Hibiscus syriacus* Linné, belonging to a distinct, though nearly related, genus.

CLXVI.—THE COMMON MALLOW.

Malva sylvestris Linné.

THE genus *Malva* takes its name, as we have seen, from the Greek *μαλάχη*, *malache*, which refers to the emollient properties of its mucilaginous juice. It is sometimes difficult to accept seriously etymologies propounded even by authorities, as, for instance, when Dr. Prior derives *Hock*, an old name for the Mallow, from the Latin *Alcea*, and suggests that the *Holli-* of *Hollihock* is the Latin *caulis*, referring either to the tall stem, or to the cabbage-like flowers of the double varieties. In this commonest species of the genus it may be noted that *sylvestris* is very generally employed by botanists merely in the sense of “wild,” as opposed to *hortensis*, belonging to the garden, or *sativa*, sown, and that it is not meant to suggest any connection with woods.

Malva includes a small number of species of herbaceous plants, natives of the North Temperate region of the Old World, although all our three British species have been introduced unintentionally, as weeds of cultivation, into the United States. The distinctive botanical character of the genus is the epicalyx of three distinct leaves or bracteoles. The flowers secrete honey and the gynæceum consists of a ring of numerous one-seeded carpels round a short, thick axis, with a separate style to each carpel.

Our three British species are all perennial, but are sharply contrasted in general habit and in floral characters.

The Common Mallow (*Malva sylvestris* Linné) is a robust, erect, branched and widely spreading plant, from one to three feet in height, though in some poor soils it will lie prostrate. Its long, slightly-branched tap-root will secure its position on the loose rubbish of a roadside heap or the sand by the sea, and the plant often becomes sub-dominant in waste-places before much other vegetation has made its appearance. Its leaves are rounded, palmately veined, and from three- to seven-lobed, crenate-serrate, and from two to three inches across. They are plicate in the bud and their stalks, like those of the flowers, are downy or hairy. A somewhat dull blue-green at first, they become a deeper green later, and may often be seen in autumn thickly covered with the brown spots of the parasitic fungus *Puccinia malvacearum* Montagne. This rust, a native of Chile, spread first to Australia, soon afterwards entering Europe through France ; and at one time its ravages made the cultivation of the Hollyhock almost impossible. The numerous flowers of the Mallow, produced from June to September, and each from an inch to an inch and a half across, are borne in axillary unilateral cymes, opening in succession. Their five divergent obcordate petals are generally a light rose-colour marked by dark crimson veins or honey-guides ; but the ground-colour may be more blue or lilac, or white ; and it is rather from the general effect of the mingling tints that we have taken our notion of the colour which bears the French name of the plant, *mauve*. Honey



THE COMMON MALLOW—continued.

is secreted in little pockets in the receptacle at the base of the petals, covered with hairs that serve to exclude rain and very short-tongued insects ; and, as in *Althæa*, the five staminal groups, before uniting with one another, are so united to the petals as to make these appear gamopetalous. This species is markedly protandrous. When the flower first opens the stamens stand up as a cone in the centre over the as yet undeveloped styles. Having shed their pollen, they wilt and hang downwards, serving apparently as collecting hairs to receive pollen brought by insects from other flowers. The ring of styles then elongates and spreads outwards, occupying the original position of the anthers, whilst their inner surfaces become receptive. More than fifty species of insects have been recorded as visiting the flowers ; and, apparently, if they have failed to pollinate the stigmas directly, the styles bend over among the withered stamens and thus their stigmas come in contact with any pollen that may be clinging to them.

The fruit forms a cushion-shaped ring of smooth carpels covered with a network of wrinkles and attached to an acutely conical axis with concave sides. There is a variety (var. *lasiocarpa* Druce) in which the carpels are hairy. Each carpel contains one curved ascending seed, the embryo of which is enclosed in a slightly mucilaginous albumen. This is insipid, though not unwholesome ; and, under the name of *Cheeses*, the fruits are great favourites with children, who thread them on strings, open them and eat the seeds. Thus John Clare writes of

“The sitting down when school was o’er
Upon the threshold of the door,
Picking from mallows, sport to please,
The crumpled seed we call a cheese.”

Nor is it children only who find material for wonder in this symmetrical little structure. Lindley saw in it an example of the argument from design.

“Only compare,” he says, in his “Ladies’ Botany,” “a vegetable cheese with all that is exquisite in marking and beautiful in arrangement in the works of man, and how poor and contemptible do the latter appear . . . Nor is it alone externally that this inimitable beauty is to be discovered ; cut the cheese across, and every slice brings to view cells and partitions, and seeds and embryos, arranged with an unvarying regularity, which would be past belief if we did not know from experience, how far beyond all that the mind can conceive, is the symmetry with which the works of Nature are constructed.”

CLXVII.—THE MUSK MALLOW.

Malva moschata Linné.

THERE is considerable evidence that the whole Order *Malvales* was originally adapted for insect-pollination. Most members of the Order have large, conspicuous, honey-secreting flowers, often dichogamous, producing, that is, their anthers and stigmas in a mature condition at slightly differing times, so that cross-pollination is almost a necessity, and not infrequently having prominent coloured veins in their petals which serve as honey-guides. Where, as in the Linden, the flowers are not so large and are not conspicuously coloured, their perfume may attract insects from a distance, and they may be so massed together as to be collectively conspicuous. A less obvious character, which is an indication of the same thing, is the pollen, which in all our three British species of Mallow, for instance, is known as *echinulate*, or sea-urchin-like, each little grain being thickly beset with minute spinous points. By them the grains become interlocked with one another and cling to the hairy legs of the bees, which group of insects are the chief visitors. This is the case alike in *Malva sylvestris*, *M. moschata*, and *M. rotundifolia*, although they differ considerably in the size of the individual pollen-grains, those of *M. sylvestris* being 140 micromillimetres in diameter, while those of *M. rotundifolia* are only 100 micromillimetres. This form of pollen-grain suggests that the small pale pink blossoms of the Dwarf Mallow (*Malva rotundifolia* Linné), which are often concealed beneath the leaves and mature their pollen and stigmas simultaneously so as to be often self-pollinated, are either ancestrally or otherwise adapted for at least an occasional cross. Observation shows that this is the case: although the pallid little flowers hidden under the lee of some roadside barn are not visited by nearly so many species or individuals of insects, it is insect-visited. When its anthers have discharged their pollen, the styles have already elongated and they twist in among the stamens, which do not bend backward as in *M. sylvestris*. In this way pollen may reach the receptive stigmatic inner surfaces of these styles either from the anthers of the same flowers or from those of others whence it has been brought by insect agency. On the other hand, the large red and orange flowers of such Tropical genera as *Hibiscus* and *Abutilon*, though pollinated in Tropical America by humming-birds, may, in other countries, have the same function performed by the longer-tongued bees. It is noteworthy that in *Abutilon* the flowers are pendulous, being thus well adapted to the hovering flight of the tiny birds; that the epicalyx, usual in the Family *Malvaceæ*, is absent, thus offering less obstacles to the entrance of small crawling insects for which, rather than for honey, the birds visit the flowers; and that the colour is often red or orange, favourite colours apparently with humming-birds and thus with ornithophilous flowers. It is easy to understand that an entomophilous flower may readily become so modified as to be suited for bird-pollination, or so as to be self-pollinating.



THE MUSK MALLOW—continued.

It is, however, somewhat difficult to explain the special characters of the beautiful Musk Mallow (*Malva moschata* Linné). Its pale green erect stems rise erect and but seldom branched to a height of one or two feet in gravelly places and have spreading hairs and are often spotted with red. The leaves are deeply palmately 5-7-lobed, the lobes themselves being pinnatifid; but so variable is the extent of the lobing that several varieties have been named which differ only in this respect. It is interesting to note that even the cotyledons are slightly trilobed. Though the late Lord Avebury explained this on purely mechanical grounds as the result of the folding and packing of ovate cotyledons within a rounded seed, it might equally be considered as an example of anticipatory inheritance. Stem and leaves give off a musky perfume, especially in hot weather, or when drawn through the hand. This may serve as a protection against browsing animals; and possibly the cut leaves, though securing a considerable surface for gaseous exchanges with the atmosphere, may also serve as such a defence.

The calyx is very conspicuous owing to its very pale green colour, a pretty contrast with the greener stems, the darker foliage, and the rosy corolla. It is coarsely hairy or bristly, a good protection against crawling insects. Though the corolla is of one uniform colour, with hardly any trace of honey-guides, its large size—often two inches across—makes it conspicuous by day and the pale tint remains visible late into the summer night. A beautiful white variety, retaining the rose-coloured anthers of the ordinary form, is common in gardens and occurs occasionally in a wild state. In insect-visitors and pollination-mechanism this species seems to agree closely with *M. sylvestris*.

The carpels have not got the reticulate surface of those of the Common Mallow, though they are transversely wrinkled and densely covered down their rounded backs with long silky hairs. This would seem to be a protective character.

This handsome plant can be readily cultivated and is well worth growing both for its foliage and its flowers, the rose-coloured and white varieties looking well together. It flourishes in ordinary good garden loam, which is much richer than the soil in which it occurs wild, but should have good drainage. It seeds freely and the seeds can be sown in the open border in April or May, or in a cold frame during the autumn. In the latter case the seedlings should be protected from winter frosts. Cuttings may also be struck during the summer and require similar protection.

CLXVIII.—THE TUTSAN.

Hypericum Androsæmum Linné.

IT seems regrettable that Dr. Engler should have retained the name *Parietales* for an Order so different in its constituent Families from Bentham and Hooker's Cohort of the same name. Bentham and Hooker's group included *Sarraceniaceæ*, *Papavcraceæ*, *Cruciferæ*, *Resedaceæ*, *Cistaceæ*, and *Violaceæ*: Dr. Engler's comprises, with other Families, the *Camelliaceæ*, *Guttiferæ*, *Tamaricaceæ*, *Cistaceæ*, *Violaceæ*, and *Passifloraceæ*; but not the first four Families in the earlier arrangement. The name *Parietales* (from the Latin *paries*, a partition-wall, with reference to the placentation) is, of course, equally applicable to all these groups.

Engler's Order consists of plants which have generally heterochlamydeous flowers, *i.e.* distinct calyx and corolla, with their parts partly or wholly in whorls, and in most cases a large number of stamens. The carpels may, or may not, be united, and, though usually superior, are in some cases sunk in the receptacle and united to it, so that the flower becomes epigynous. Of the Families mentioned above as included in the Order, the *Camelliaceæ*, woody plants with simple, exstipulate, and generally scattered leaves, among which are the Tea (*Thea sinensis* Linné) and the garden favourite the Camellia (*Camellia japonica* Linné), and the *Passifloraceæ*, the Passion-flowers, are not represented among British plants; whilst the *Guttiferæ* or Gamboge Family, mostly tropical trees with opposite leathery leaves and flowers often unisexual, are made by Engler to include the *Hypericums* which have previously been treated by most systematists as a distinct Family *Hypericaceæ*. The *Guttiferæ*, in the extended sense thus used by Engler, is not a large group, comprising less than five hundred species, two hundred of which belong to the genus *Hypericum*. They are mainly woody plants with opposite, exstipulate, simple, and entire leaves, containing essential oils. These oils may, as in the Gamboges—various species of *Garcinia*—and in *Vismia*, have resins dissolved in them, or they may, as in *Hypericum*, appear in transparent glands in the leaves. The red or yellow and more or less resinous and aromatic or balsamic juice present in many species of the latter genus is certainly an indication of its close kinship with the Gamboge group. It has been suggested that these oils serve to protect the plants from the attacks of insects or of browsing animals.

The flowers of *Guttiferæ* are mostly polysymmetric and pentamerous, though some whorls may be reduced to three parts each. Their stamens are numerous, though in *Hypericum* and others they appear to be rather the result of the branching of five or three. As these branched stamens are not carried up on a common tube, as are those of the *Malvaceæ*, they are known as *triadelphous* or *polyadelphous*. Since the flowers do not as a rule produce honey, the production of an extra amount of pollen is, perhaps, connected with insect visits. The three or five carpels are united and superior, but differ in the extent to which they are inrolled towards the centre,



THE TUTSAN—continued.

so that the ovary may be one-chambered or three- to five-chambered. The seeds are exalbuminous.

The Sub-Family *Hypericoideæ*, which includes a few small genera in addition to *Hypericum*, are further characterised by having their styles in general free. Anthers and stigmas are usually mature at the same time ; but the stigmas are frequently thrust outwards by the divergent styles between the tufts of stamens, and in this way a cross may be effected when insects alight on the petals.

The uniformly yellow flowers and tufted stamens render the two hundred species of *Hypericum* so obviously a natural group that we follow the general practice of British botanists in treating them all as one genus, although there is a good deal to be said for the continental practice of dividing it into several. The Tutsan (*Hypericum Androsæmum* Linné) belongs to a sub-genus or Section, the genus *Androsæmum* of Allioni, distinguished by deciduous petals, five bundles of stamens with no intervening glands, and a one-chambered ovary with three only partially ingrown placentas and three styles.

It is a shrubby, glabrous plant, one to two feet high, with quadrangular compressed branches and sessile ovate or oblong leaves, which have their pellucid glands very minute and close together and give off a strong aromatic smell when they are rubbed. The inflorescence is a few-flowered, corymbose, trichasial cyme : the flowers are from half an inch to three-quarters of an inch in diameter : the sepals are blunt and have black glands but not on their margins : the petals are very oblique at the base ; and the fruit becomes a globose, purplish-black, somewhat pulpy capsule with three short hooked styles. Though essentially belonging to Central and Southern Europe, this species is certainly indigenous throughout the British Isles.

Dioscorides uses the name *Ἀνδρόσαιμον*, *Androsaimon*, from *ἀνδρὸς*, *andros*, man's, *αἷμα*, *haima*, blood, probably from the claret-coloured juice of the capsule, though Fuchs says "they have said that the flower rubbed in the fingers, emits a blood-coloured juice." Gerard says :—

"The leves, floures, and seeds stamped, and put into a glasse with oile olive, and set in the sunne for certain weekes, doth make an oile of the colour of blood, which is a most pretious remedy for deep wounds, and those that are thorow the body.
... The leves laide upon broken shins and scabbed legs healeth them, and many other hurtes and griefes, whereof it tooke his name Tout-saine or Tutsane, of healing all things."

This name Tutsan has been variously corrupted into *Touch-leaf*, *Touch-and-heal*, and *Tipsy-leaf* ; and, by a complete misunderstanding, has been translated into *All Saints' Wort*—a most inappropriate name for a species that flowers in July and August. Though its repute as a vulnerary was undoubtedly based on the doctrine of signatures, the balsamic astringent juice has some efficacy, so that the present complete neglect of the plant is not altogether merited. A pretty local name for it, recorded by Messrs. Britten and Holland from Sussex, is *Sweet Amber*, given on account of its resinous smell.

CLXIX.—SQUARE-STEMMED ST. JOHN'S-WORT.

Hypericum quadrangulum Linné.

THE etymology of the name *Hypericum* is very uncertain. It is used in the Greek form ὑπέρικον, *Hupereikon*, by Dioscorides, and has been derived from ὑπέρ, *hyper*, beyond, and ἐρείκη, *creike*, heath. A more far-fetched derivation is from ὑπέρ, *hyper*, and εἰκὼν, *eikon*, an image, because—it is supposed—of its use as an amulet against spirits; but it is doubtful whether the belief in its power against evil spirits is of Classical origin, or not rather mediæval.

The golden radiant blossoms of the various species appear about the time of the summer solstice. The Hairy St. John's-wort (*Hypericum hirsutum* Linné) comes into flower in the south of England from June 19th to July 23rd, or on an average, according to our present calendar, on June 30th; the Upright St. John's-wort (*H. pulchrum* Linné), from June 19th to August 2nd; the Common (*H. perforatum* Linné) and the Square-stalked species (*H. quadrangulum* Linné) between the same dates. There is abundant evidence to connect ancient Celtic religious rites with a Nature-worship in which the solstices played an important part. The rites of Midsummer were the counterpart of those of Yule-tide; and the word Yule itself has been interpreted as carrying with it the notion of revolution, such as that of the seasons typified by a wheel. Down to the last century a custom lingered in Cornwall—that last refuge of Celtic tradition—of twining St. John's-wort round a wheel to symbolise the sun, taking it to a mountain top on Midsummer Eve, lighting it at the sacred bonfire and hurling it downhill, that it might roll away all evil from the man who cast it down. Barnaby Googe (1540-94), in his "Popish Kingdome," writes:—

"Then doth the joyfull feast of John the Baptist take his turne,
When bonfiers great, with loftie flame, in every towne doe burne; . . .
Some others get a rotten wheele, all worne and cast aside,
Which, covered round about with strawe and tow, they closely hide:
And caryed to some mountaines top, being all with fire light,
They hurle it downe with violence, when darke appears the night:
Resembling much the Sunne, that from the heavens down should fal,
A straunge and monstrous sight it seemes, and fearfull to them all:
But they suppose their mischiefes all are likewise throwne to hell,
And that from harmes and daungers now, in safetie here they dwell."

Serving thus to avert all evils, *Hypericum* hung outside the house was a preservative against lightning and evil spirits, worn as an amulet it averted the evil eye, and, gathered before sunrise and administered internally, it was a remedy against hydrophobia, and other forms of mania. Hence its mediæval name *Fuga dæmonum*, the German *Teufelsflucht* and *Jagelteufel*. Robert Burton, in his "Anatomy of Melancholy," writes:—

"Bassardus Viscontinus commendeth hypericon, or St. John's wort gathered on a Friday in the hour of Jupiter, when it comes to his effectual operation (that is, about the full moon in July); so gathered and borne, or hung about the neck, it mightily helps this affection, and drives away all fantastical spirits."



SQUARE-STEMMED ST. JOHN'S-WORT—continued.

With the coming of Christianity the old pagan rites of the summer solstice took their names from the feast of St. John the Baptist, and *Hypericum* became *St. John's-wort*, the German *Johanniskraut*, the Dutch *St. Jan's kruid*, the Danish *St. Hans urt*, and the Bohemian *St. Jana bylina*. The old symbolic magic degenerated into mere love-sick maiden's divination ; and in Saxony every young girl plucked a sprig of St. John's-wort on the Eve of St. John by the light of the glow-worm or "Johanniswürmchen," and stuck it into the wall of her bedroom. If the wall was damp enough to keep the sprig fresh she would be married within the year ; but if it drooped, she too would pine away.

Wishing to discriminate between the different species of what we now recognise as the genus *Hypericum*, sixteenth-century botanists coined the name *St. Peter's-wort*, which they applied to the Square-stemmed species (*H. quadrangulum* Linné) and some others, appropriately enough, since June 29th, St. Peter's Day, is a fair average date for the flowering of these species.

In the Section of the genus to which alone the name *Hypericum* is restricted by some continental botanists, the petals are persistent, the stamens are in three bundles, with no intervening glands, and the ovary is completely divided into three chambers, the edges of the carpels uniting so that the placentation becomes central. The different species are very varied in their ecology, inhabiting limestone or gravel, sandy heaths or wet ditches, and the Square-stemmed *H. quadrangulum* Linné is chiefly to be found in the last-mentioned habitat. The four green wings or flanges to its stiff, erect, and tough stems are very characteristic, and its ovate leaves have translucent veins as well as the glands so frequent in the genus. It is to these translucent glands that the genus owes its French name *Millepertuis*, and the Portuguese *Milfurada* ; and it was, perhaps, partly a fanciful view of them as wounds that gave the name quoted by Sir William Hooker as *Balm of the warrior's wound*. In Guernsey the name is *Herbe à mille pertuis*.

The cymose inflorescence in *H. quadrangulum* has its branches close together : its flowers are somewhat pale : the sepals are erect, lanceolate-acuminate, and entire, and may have black glands, but not at their margins, as also have the petals. The ovary has numerous oil-sacs or *vittæ*.

It is clearly of this species that Turner writes in his "Names of Herbes" (1548) :—

"Ascyron is not very common in England, howe be it I sawe it thys last yere in Syon parck, it hath a foursquared stalke, and is like saynte Johans grasse, but it is greater and not wyth suche holes as are in saynte Johans grasse, wherefore it maye be called in english square saynt Johans grasse or great saynt Johans grasse."

CLXX.—THE MARSH ST. JOHN'S-WORT.

Hypericum elodes Linné.

IF we were inclined to write of Tutsan under Allioni's name of *Androsænum officinale*, we are still more predisposed to use Spach's *Elodes palustris* for the Marsh St. John's-wort. It is distinguished from other species of the genus *Hypericum* by many marked characters. Its succulence and downiness may well be considered as merely adaptive in accordance with the conditions under which it lives ; but within the compass of the flower there are various characters that cannot be so described. The persisting petals are symmetrical : the three stamens have each five branches : alternating with them are small two-cleft glands pressed against the under side of the ovary and apparently secreting honey ; and the ovary is one-chambered, with three prominent parietal placentas projecting far into the ovarian cavity but without meeting in the centre, and with three styles. Nevertheless, as we explained when speaking of the Tutsan, we follow the usual English practice of considering that the general uniformity of characters justifies us in retaining the comprehensive genus *Hypericum* in its Linnæan sense and thus speaking of this species as *Hypericum elodes* Linné.

It is noticeable that the distribution of the species, both generally and within the British Isles, is exceptionally limited. It is essentially a western type, represented in Liguria and Switzerland, only in the north of Portugal and Spain, in the Azores, in France, Belgium, Holland, and only the north-west of Germany. It occurs in the Channel Islands, throughout Ireland (where suitable habitats for it abound), in Wales, but mainly in the south and west of England and in the west of Scotland.

In contrast with the stiff, slender, wiry, smooth, red-tinged stem of the Upright St. John's-wort (*H. pulchrum* Linné), which inhabits dry heathy situations, this marsh species has soft, succulent, hairy, pale green stems of much more considerable diameter in proportion to their height. Growing in spongy bogs, and often actually in the shallow water at the margin of marsh pools, its stems are prostrate below, branching freely at first and producing adventitious roots from their nodes, then bending upward into an erect position and from three to eight inches high. The ascending branches may be round or slightly angular in section. The rounded leaves are sessile and sometimes heart-shaped at the base, not more than an inch long, with minute pellucid glands, and covered, like the stem, with a soft shaggy down of long simple, colourless hairs. This long-haired tomentum, so common on water-side plants, liable as they are to frequent wetting and occasional submergence, may be an adaptation to prevent, at least in the first case, the clogging of the stomata by water ; but the situations in which the plant grows, associated, as it often is, with the Bog-Mosses and the Sundews, suggest that its soil-water may often be acid, so that the soft, thin-walled cellular tissue of the stem may be a true water



THE MARSH ST. JOHN'S-WORT—continued.

storage tissue and the hairs a means of diminishing transpiration. On normally wet heaths, such as that of Studland in Dorsetshire, we have seen large patches of this species destroyed by summer drought.

As the blossoms do not appear till July or the close of June, this species is appropriately one of those for which the name *St. Peter's-wort* was proposed by sixteenth-century writers ; but, though many popular names have in their origin been merely book-names, when one of these literary proposals fails to secure the sanction of genuinely popular usage it remains merely a book-name, whatever its antiquity. The flowers are produced in terminal and axillary, trichasial, few-flowered cymes, each of them being about half an inch across and of a pale yellow colour, with none of the gloss or almost metallic sheen of the Common St. John's-wort (*H. perforatum* Linné) and many of the other species. The petals have green midribs down their external surfaces and only expand in bright weather. The sepals are ovate, blunt, and glabrous, with the exception of a pretty marginal fringe of short red glandular hairs, which are presumably a protection against crawling insects. Since the flowers are homogamous, self-pollination probably often takes place ; but the apparently nectariferous glands, the comparatively small amount of pollen produced, and the exclusion of crawling insects, all point to at least occasional crossing by flying ones.

The first mention of this species as British seems to be that by Thomas Johnson in his "emaculate" edition of Gerard's "Herball" (1633), where he states that

"*Ascyrum supinum* ἐλώδης . . . is to be found upon divers boggy grounds of this kingdom."

Both ἄσκυρον, *Askuron*, used for St. John's-worts generally, and the adjective ἐλώδης, *helodes*, swampy, are Classical Greek words, while *supinum* means pro-cumbent or trailing ; so that Johnson's name is an apt one.

Besides the three species here figured, ten or twelve others occur in Britain, while the European species number forty-seven. Several of these latter are in cultivation, as are also a few Japanese, Asiatic, and North American species. They prefer a rich sandy loam but will grow in any ordinary garden soil, and are readily reproduced by seed, by cuttings, or by dividing the rhizomes. They are all perennials and many of them retain their leaves through the winter. One of the handsomest is the Rose of Sharon (*Hypericum calycinum* Linné), a native of the Mediterranean region, naturalised in many shrubberies in England. It has low-growing, four-angled stems, about a foot high, large ovate, leathery leaves twisted into one plane, and magnificent terminal golden blossoms three inches in diameter.

CLXXI.—THE TAMARISK.

Tamarix anglica Webb.

TWO small Families of the *Parietales* are not represented here. These are the *Elatinaceæ*, the Water-Pepper or Pipewort Family, including two rare British submerged aquatic plants, and the *Frankeniaceæ*, the Sea Heaths, one of which, a halophyte with inrolled hairy, heath-like leaves, is British. Closely related to this latter is the Family *Tamaricaceæ*.

With our moist climate and generally fertile soil, it is only the sandy sea-shore, more or less permeated by saline water, which shows us any parallel in its vegetation to the desert areas of other regions. There Sea Holly, Sea Kale, the Yellow Horned Poppy, and other fleshy plants covered with a blue-grey bloom of wax, may flourish even among the shingle: the short turf sloping to the sea will be diversified with Thrift, stunted Gorse, and other low-growing plants; while Tamarisk bushes may wave their feathery branches along the margin of the beach.

The *Tamaricaceæ* is a small Family, but one of wide geographical range. They are shrubs or small trees with whip-like branches, minute, scale-like leaves, and spikes of small blossoms, and are found from Japan and China to Madeira and the Canary Islands and from Siberia to Senegambia. They inhabit deserts, steppes, and sandy shores in sub-tropical or Temperate climates, and are among the few plants which seem to flourish best in the salt air and water near the sea. Of the ninety species, in five genera, belonging to the Family, more than two-thirds belong to the genus *Tamarix*, the distribution of which is almost as wide as that of the Family as a whole. The minute, scattered leaves have no stipules: the parts of the little polysymmetric and perfect blossoms are in fours or fives, except that the stamens may be twice as many, or even indefinite, in number, and that the one-chambered ovary may be made up of two, three, four, or five carpels. The ascending, parietal ovules are anatropous, and become, in the seed stage, plumed with hairs like those of the Willows.

Tamarix anglica Webb is, in spite of its name, very doubtfully wild on our coasts. It seldom approaches the dimensions of a tree; but its tolerance of the boisterous sea-breezes, the bright green of its almost perennial foliage, contrasting with its red-hued branches and its delicate little spikes of pink blossom, make it a valuable acquisition to our shores. Its slender ascending branches would suggest a Willow, did not the minute, closely-overlapping leaves immediately recall the Cypresses and Heaths. The shrub is still occasionally known as *Cypress* in Cornwall and as *Chipre* in Guernsey, and seems to have been confused with Heath or Ling in early times. Common on the shores of the Mediterranean, the Tamarisk must have been known to the early Greek botanists. Pliny says that it was the *Μυρίκη*, *Murike*, of Dioscorides; but the origin of the name Tamarisk is uncertain. It has been derived from the Hebrew *tamarik*, cleansing, from its use either for purifying the



THE TAMARISK—continued.

blood or for making brooms ; and from the river Tamaris, now the Tambro, in the Pyrenees, on whose banks the tree abounds. Turner, in his "Names of Herbes," writes :—

"Myrica, otherwyse named tamarix, and of the Herbaries Tamariscus, is named in duche tamariske, in french tameris. I dyd never see thys tree in Englande, but ofte in high Germany, and in Italy. The Poticaries of Colon before I gave them warning vsed for thys, the bowes of vghe, and the Poticaries of London vse nowe for thys quik tree, the scholemaisters in Englande have of longe tyme called myrica heath or lyng, but so longe have they bene deceyved altogether. It maye be called in englishe, tamarik."

In the face of this statement we do not know why Sir J. E. Smith says that the Tamarisk was "commonly planted in English gardens and shrubberies, long before Archbishop Grindal imported it." Grindal returned from the Continent in 1558, and the following year became Bishop of London ; whilst it is said that Elizabeth visiting him at Fulham complained that he had planted so many trees round his house that she could not see out of the windows.

The Tamarisk commonly reaches ten or fifteen feet in height but may attain to double that size. The branches are free from hairs, but bear the scars of many fallen leaves and numerous cork-warts. They change with age from red to purple and brown. The leaves are also smooth, but slightly glaucous. The spikes of blossom open from July to October and are both terminal and lateral, reaching about an inch in length and crowded with the tiny flowers which are but an eighth of an inch across and arise in the axils of minute bracts. In a careful paper, published in "Hooker's Journal of Botany" in 1841, Philip Barker-Webb first pointed out that there are two distinct kinds of Tamarisk on the shores of France. The loftier *Tamarix gallica* Linné (the *Tamariscus narbonensis* of Pena and Lobel), on the Mediterranean, has its five red-anthered stamens springing from between the five bilobed crenellations of the little hypogynous disk : its capsule tapers gradually from base to apex, like a pyramid ; and the tufts of hair on its seeds do not quite reach the apex of the capsule. The other species is that which grows along the western and northern shores of France and is found in England, for which reason Webb named it *T. anglica*. Its stamens spring from the points of the five lobes of the disk : its capsule is flask-shaped ; and the tufts of hair on the seeds are distinctly shorter than the capsule.

Various suggestions have been made as to the introduction of the tree into England, independently of Bishop Grindal's alleged action. Smugglers from France are said to have brought it to St. Michael's Mount. A carter from the Mount gathering one of the flexible branches for a whip is said to have stuck it into the ground at the Lizard ; whilst a tree in the garden of the rectory on the island of Foulness is said to have been planted by one of the Dutchmen who embanked the island in the seventeenth century.

CLXXII.—THE COMMON ROCK-ROSE.

Helianthemum Chamæcistus Miller.

LIKE the *Tamaricaceæ* and *Frankeniaceæ*, the Rock-rose Family, *Cistaceæ*, are an essentially xerophilous group. Unlike those two Families, but like many other Families in the Order *Parietales*, they have the relatively large and conspicuous but somewhat fugitive blossoms that specially mark the plants of sunny climes. The Family comprises four genera, with some 160 species between them, of which 120 belong to the genus *Helianthemum*, the only one represented in Britain. They are nearly all natives of the North Temperate Zone, especially of the Mediterranean region, growing in dry, sunny places with warm soils, sandy, or more frequently calcareous. Though sometimes annual and herbaceous, they are for the most part perennial shrubs or undershrubs with woody or wiry stems, and very often with evergreen, leathery, inrolled, heath-like leaves. It is in accordance with their usual places of growth that they have usually some glandular hairs on their surface, which may serve for the taking in of atmospheric nitrogenous gases. The presence or absence of stipules was correlated by the late Lord Avebury, as a means of protection for the buds, with the possession of narrow or of broad bases to the blades of the opposite simple and entire leaves. The flowers are perfect and polysymmetric and may be solitary or in unilateral cymes. They do not produce honey but, as in the *Hypericaceæ*, have an indefinite number of anthers, and thus produce an extra supply of pollen so as to attract insects. The calyx may be looked upon as having five distinct imbricate sepals, of which the two outermost are markedly different in size from the three inner ones, or the outer two may be considered as bracteoles. The petals, usually five in number, are convolute in the bud, overlapping one another in a different direction than do the inner sepals: they may be yellow, white, or various shades of orange, red, and pink, but are never blue: they have a remarkably delicate, tissue-paper-like texture; and fade or fall off after being open for merely a day or two. The stamens are generally numerous and free, springing from a hypogynous disk: the three, five, or ten carpels are united into a superior one-chambered ovary, with more or less inrolled parietal placentas, unbent ovules, a single style, and three stigmatic lobes; and the fruit is a capsule splitting into three or five valves along the midribs of the carpels. The seeds are albuminous with a curved embryo.

The genus *Helianthemum*, originally so called by Valerius Cordus (1515-44) from the Greek ἥλιος, *helios*, the sun, ἄνθεμον, *anthemon*, a flower, is specially characterised by its low growth, relatively smaller flowers than in *Cistus*, smaller outer sepals or bracteoles, more or less irritable stamens, and three-valved capsule. The first of these characters, in marked contrast to the shrubby species of the allied *Cistus* which are so striking a feature in the vegetation of the Mediterranean region, made the early botanists name it *Chamæcistus*, *i.e.* Dwarf *Cistus*, from the Greek



THE COMMON ROCK-ROSE—continued.

χαμαί, *chamai*, on the ground, and κίστος, *kistos*, the *Cistus* ; and this name was retained as a specific name for our commonest species by Philip Miller in the eighth edition of his "Gardener's Dictionary" (1768).

Philip Miller was born in 1691 and became, in 1722, gardener to the Apothecaries' Company at Chelsea. Habituated to the use of Ray's system of classification, he was reluctantly persuaded by Hudson and Sir William Watson to adopt that of Linnæus. He was, says Dr. Pulteney, in his "Biographical Sketches" (1790),

"the only person I ever knew, who remembered to have seen Mr. Ray. I shall not easily forget the pleasure that enlightened his countenance, it so strongly expressed the *Virgilium tantum vidi*, when, in speaking of that revered man, he related to me that incident of his youth."

Miller was only fourteen at the time of Ray's death. In 1731 he published his "Gardener's Dictionary," that "gran' wurrk," as the Old Squire's Scotch Gardener in Mrs. Ewing's "Mary's Meadow" termed it, and the eighth edition, that of 1768, was the last issued during his lifetime. Linnæus, who visited the Chelsea garden in 1736, and afterwards corresponded with Miller, styled it "*Non Lexicon Hortulanorum, sed Botanicorum*," "Not only the gardener's, but the botanist's dictionary."

The name *Rock-rose* belonged originally to the genus *Cistus*, whose blossoms are often about the size of those of a briar rose, from which they are generally distinguished by the coloured spot at the base of each petal. Such names as *Little Sunflower*, *Sun-rose*, and *Sun-daisy* have been proposed for *Helianthemum* ; but have not been generally adopted. They all of them serve to express the dependence of its blossoms upon sunshine for their expansion.

The slight irritability of the stamens is of no very obvious utility. If touched, in some species, but only if pinched in *H. Chamæcistus*, they spread outwards towards the petals. The flowers are homogamous, but are freely visited by pollen-seeking insects, and set seed abundantly ; but some species produce apetalous flowers as well as the more conspicuous ones.

In addition to *H. Chamæcistus*, which abounds on chalk and limestone hills, we have several rare species with hoary leaves, and one of these, the annual *H. guttatum* Miller, recalls *Cistus* in having a red spot at the base of each petal ; but most of the beautiful forms which are among the most charming plants in our rock-gardens in summer are varieties of *H. Chamæcistus*. These have white, pink, saffron-coloured, or coppery-red flowers, which are sometimes double. They are readily propagated by division and grown in sandy soil, so that the calcareous nature of the original habitat does not seem essential.

CLXXIII.—ANALYTICAL DRAWINGS OF THE MALLOW AND PARIETAL ORDERS.

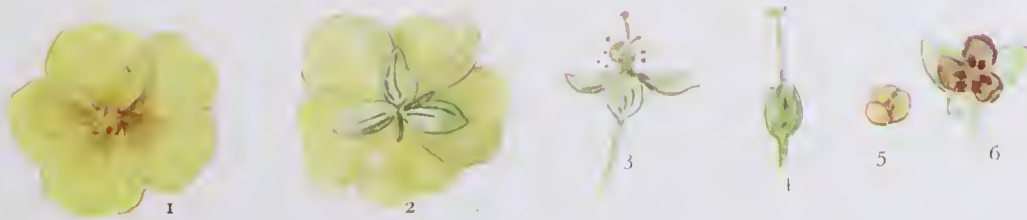
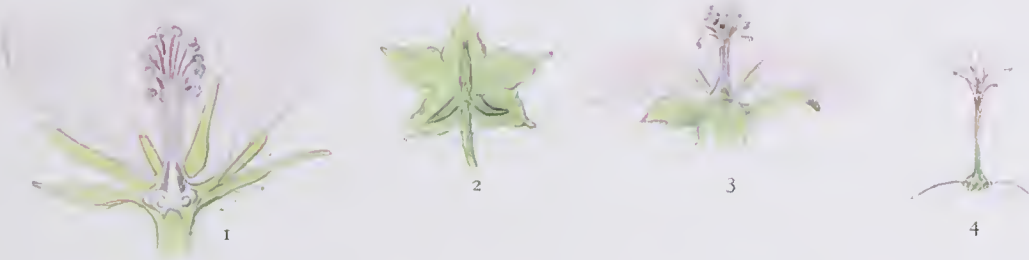
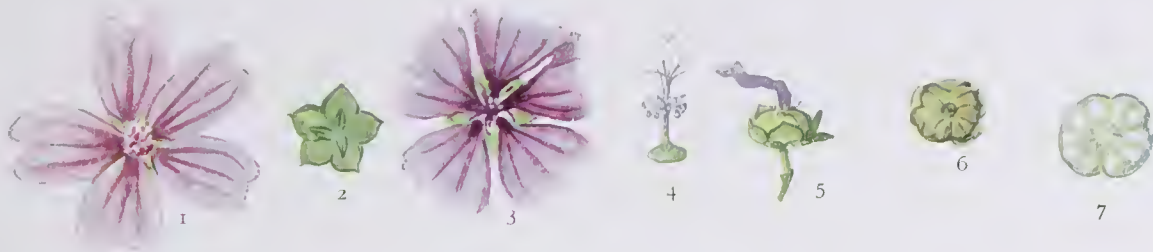
(*Malvales* and *Parietales*.)

TWO of the most striking features in the Family *Malvaceæ* are the large flowers and the five much branched and united stamens. These characters are well shown in the Cottons, species of the genus *Gossypium*, which, on account of the abundance of long soft hairs with which their seeds are covered, are economically by far the most important plants in the Family. The first two lines of figures on this Plate represent two species of the genus *Malva*, both large-flowered, the Common Mallow (*Malva sylvestris* Linné) and the Musk Mallow (*M. moschata* Linné).

In the first line, Fig. 1 represents a flower of *Malva sylvestris*, seen from above, of natural size, showing the obcordate petals marked with honey-guides and the central mass of stamens. Fig. 2 shows the calyx and epicalyx—that striking feature of the genus—as seen from below. Fig. 3 is an enlarged view of the centre of the flower, seen as in Fig. 1, showing how the calyx closes the spaces between the narrowed claws of the petals. Fig. 4 are the essential organs, seen at the stage when the anthers have discharged their pollen and their filaments have bent downwards, while the styles have elongated. Fig. 5 is the young fruit with withered styles; Fig. 6, the “cheese,” or fruit, dividing into ten mericarps, with the persistent calyx; and Fig. 7 is the same in transverse section, showing the seeds and central axis.

In the second line of figures, Fig. 1 is a vertical or longitudinal section through a flower of the Musk Mallow (*M. moschata* Linné), exhibiting the epicalyx and calyx, petals of uniform coloration, and central staminal tube. Fig. 2 is the epicalyx and calyx seen from below; Fig. 3, a flower with some petals removed, showing the base of the others; and Fig. 4, the gynæceum.

In the Order *Parietales*, as is seen in the remaining figures on this Plate, the pentamerous symmetry, so general among Dicotyledons as a Class, is the rule. In the Families of the Order that have representatives in the British flora it is also the rule that the gynæceum is superior and not in any way adherent by its sides to, or sunk in, the receptacle, the latter being, in fact, slightly convex on its upper surface. In the *Guttiferæ*, here represented by three species of *Hypericum*, in the third, fourth, and fifth lines of figures, the stamens may be originally five, as in *Malvaceæ*, which is seen to be the case in *Hypericum Androsæmum* Linné, in the third line; or they may be reduced to three, as in the two other species shown here. In all cases they are more or less copiously branched; but, unlike those of the *Malvaceæ*, they are not carried up on a common tube, and are thus described as polyadelphous instead of monadelphous. In both cases, however, a study of development shows that we have to do mainly with branching of a few original staminal papillæ and not with the cohesion of numerous originally distinct stamens.



ANALYTICAL DRAWINGS OF THE MALLOW AND PARIETAL ORDERS—continued.

In the third line, Fig. 1 is a flower of the Tutsan (*Hypericum Androsæmum* Linné) seen from above, natural size. It will be observed that the five tufts of stamens lie between the petals. Fig. 2 is the same flower, seen sideways, with two petals removed, at a stage when the stigmas have already been pollinated and the three styles are withering. Fig. 3 shows the young fleshy capsule, still retaining its styles and green calyx; Fig. 5, the same in longitudinal section; Fig. 4, a ripe fruit dehiscing; and Fig. 6, a transverse section of the ovary, showing it to be one-chambered with three prominent parietal placentas, each bearing several vertical rows of ovules. It was largely the consideration of Mrs. Perrin's three dissections of the ovaries of the Tutsan, the Marsh St. John's-wort, and of the Square-stalked species (*Hypericum Androsæmum* Linné, *H. elodes* Linné, and *H. quadrangulum* Linné), here seen as the sixth figure in these three rows, that inclined me to separate these forms under the three genera commonly recognised on the Continent as *Androsæmum*, *Elodes*, and *Hypericum* sensu stricto.

In the fourth line, representing the Marsh St. John's-wort (*Hypericum elodes* Linné), Fig. 1 is a flower seen from above, natural size; Fig. 2, the calyx, also natural size; Fig. 3, the same enlarged to show the marginal fringe of red glandular hairs; Fig. 4, the essential organs, seen laterally and enlarged; Fig. 5, the same later, with the three clusters of stamens united for much of their length; and Fig. 6, a cross section of the ovary, similar to that in the Tutsan.

In the fifth line, representing *H. quadrangulum* Linné, Fig. 1 is a flower seen from above, slightly enlarged; Fig. 2, the calyx, natural size; Fig. 3, the three deeply-divided staminal clusters; Fig. 4, the young gynæceum, showing the divaricating styles; Fig. 5, a longitudinal section of the gynæceum enlarged; Fig. 6, the same in cross section, showing the central placentation; Fig. 7, a fruit, natural size; Fig. 8, the same dehiscing; and Fig. 9, the empty valves seen from above.

The sixth line of figures represents *Tamarix anglica* Webb, the Tamarisk, all the figures being necessarily enlarged. Fig. 1 is a flower; Fig. 2, the calyx and gynæceum; Fig. 3, a flower in longitudinal section, showing the hypogynous disk and the flask-shaped gynæceum; Fig. 4, a fruit; Fig. 5, the same dehiscing, showing the tufts of hair on the seeds to be shorter than the valves of the capsule; and Fig. 6, a seed.

The last line of figures represents the Rock-rose (*Helianthemum Chamæcistus* Miller), Fig. 1 being a flower seen from above; Fig. 2, the same seen from below; Fig. 3, a flower with its petals removed; Fig. 4, the calyx closing round the ovary; Fig. 5, the capsule bursting into three valves as seen from above; and Fig. 6, the burst fruit, with persisting calyx and disclosed seeds. The first five figures are of natural size; the sixth, enlarged.

CLXXIV.—THE SWEET VIOLET.

Viola odorata Linné.

THE Family *Violaceæ* is exceptional among *Parietales* in having the flower generally monosymmetric. It is a small but widespread Family, of varied habit, comprising some three hundred species in fifteen genera ; but of the species two-thirds belong to the genus *Viola*. The Family as a whole is characterised by scattered, simple, stipulate leaves ; perfect and often showy, pentamerous flowers, with a persistent calyx, a hypogynous corolla, often with a spur to the anterior petal ; one whorl of stamens with very short filaments, and introrse anthers ; and three carpels united into a one-chambered ovary, with parietal placentas and a single style, becoming a three-valved, loculicidal capsule.

Ruskin once suggested a general re-naming of plants, in which feminine names were to be reserved for merely beautiful plants, while masculine ones were to be bestowed upon those with strongly medicinal powers ; and he selected *Viola* as an appropriate feminine name. Unfortunately for this suggestion—too fanciful to commend itself to scientific minds—the genus *Viola* and some other members of the Family have powerful laxative and emetic properties.

Viola is the only European genus in the Family and is almost cosmopolitan ; but belongs mainly to North Temperate regions. The sepals are produced at their base into auricle-like projections, so that they appear to be attached above their bases ; and the whorl is interrupted by the spur of the anterior petal. This petal, which is the largest of the five, forms a landing-place for insect-visitors, whilst its spur does not secrete honey, but merely holds that secreted by the tail-like appendages of the two anterior stamens. The genus is remarkable not only for the considerable range of colour in its flowers—from the primitive white and yellow to the higher red, purple, or blue—but more particularly from the occurrence in some species of more than one colour in the same flower, these colours belonging in some cases to two very distinct series, the one generally dissolved in the cell-sap, while the other exists in granules.

By a sharp curve in the flower-stalk the flower is usually inverted, so that when the anthers burst, their pollen can fall into a little cup formed by the processes projecting from their apices. The filaments form a very short, broad base, and the straight-sided anthers are united by their edges, while their connectives or midribs are prolonged into triangular processes round the style. It is from the bases of the connectives of the two anterior stamens that the honey-secreting tails extend into the spur. The style rising from the apex of the conical ovary is dilated above into a club-shaped or rounded mass, the stigmatic surface being either the under surface of the bent extremity or the inside of a little hole in the bird's-head-like knob.



THE SWEET VIOLET—continued.

Self-pollination is rare among Violets, most of them being visited for the sake of their honey by bees ; but it is remarkable that in the case of several series of allied species in different mountain regions we find as we ascend the mountains that the flowers of the Violets are larger and have longer spurs, being thus adapted for cross-pollination by butterflies—a more alpine group of insects.

Our Sweet Violet (*Viola odorata* Linné), however, is very rarely visited by insects, and its well-known and deliciously fragrant, if modestly hidden, flowers seldom set seed, although, as Mrs. Gregory, the latest monographer of the group, has shown, this is not the absolutely unheard of occurrence which it has sometimes been represented to be. On the same plants, later in the summer, the sweet-scented purple or white flowers are succeeded by others, borne on shorter peduncles, so that they are overshadowed by the leaves. These flowers are *cleistogene*, never, that is, expanding : their sepals remain closed, so that they are often mistaken for buds : their petals are quite minute : their five stamens all produce a little pollen which germinates within the anthers, its tubes penetrating the walls of the anthers to reach the stigma over which they press ; and they form the capsules which yield the bulk of the seed.

This production of *cleistogene* or *cleistogamous* flowers, which are necessarily self-pollinating, would seem to be a provision for securing the setting of some seed, even if insect visits fail, though in attaining this end the advantages of crossing have to be sacrificed.

Together with these special adaptations for seed-production, the Violets have others to secure its dispersal. The dry ripe capsules split into three boat-shaped valves which spread out horizontally, each having a placenta with one or two rows of seeds down its middle line. The seeds are small, round, and polished ; and, as the sides of the boat-like valve dry, they shrink towards one another and squeeze off the seeds in succession. Whilst, however, in the tall scentless Dog Violet (*Viola canina* Linné) the capsules are borne aloft and the seeds thus thrown to a distance of several feet, in the low-growing Sweet Violet (*V. odorata* Linné) the capsule generally lies on the ground and the seeds are not thrown so far.

The name Violet, applied to a variety of early-flowering plants, is a mediæval diminutive of the Latin *Viola*, which is itself a diminutive of the Greek *ἰον*, *ion*, a name which the ancients connected with that of the Ionian race. The purple blossoms hidden by the leaves have been taken alike as a symbol of humility and as the badge of the imperial claims of the Bonapartes.

CLXXV.—PANSIES.

Viola tricolor Linné and *V. arvensis* Murray.

THE British representatives of the genus *Viola*, some fourteen species, fall into two sharply contrasted Sections or sub-genera known technically as *Nominium* and *Melanium*, though we may well render these names as Violets and Pansies.

The Violets, as we have seen, have cleistogamous flowers, produced in late summer or autumn, as well as the earlier and more conspicuous blossoms. Their stipules are comparatively small, membranous, and simple: their upper petals are directed forward; and their stigmas are external. Of this group the species we have here represented is the favourite Sweet Violet (*V. odorata* Linné). It is a perennial with a thick scaly rhizome sending out long rooting branches or stolons. Its leaves are broadly cordate, with their stipules fringed with glandular hairs, and a few depressed hairs on their stalks and on the peduncles. There are a pair of small bracts rather above the middle of the flower-stalk: the spur is nearly straight and generally of a deep violet colour, while the tails of the anthers within it are bluntly lanceolate and curve downward; and the capsule is bluntly triangular, downy, and often tinged with purple. Mrs. Gregory describes five well-marked varieties, and five distinct hybrids with *Viola hirta* Linné. The White Violet (*V. odorata*, var. *dumetorum* Rouy and Foucaud) is even more frequent in a wild state than the typical purple form.

The Sweet Violet has been a favourite with our poets from Chaucer downward. Abundant around Stratford-on-Avon, it seems to have been especially dear to Shakespeare; but we can only quote here a pretty simile from St. Francis of Sales:—

“A true widow is,” he says, “like a little March Violet, shedding an exquisite perfume in the fragrance of her devotion; and, always hidden under the ample leaves of her lowliness, and by her quiet dress showing the spirit of her mortification, she seeks untrodden and solitary places.”

The Pansies, on the other hand, have no cleistogene flowers: their stipules are large, leafy, and pinnately lobed: their upper petals stand erect; and their stigma lines a little hole in the knob-like extremity of the style, and has a tuft of hairs on each side of it. The forms included in this Section are unquestionably variable. They include annual, lowland, small-flowered, self-fertile forms, such as *Viola arvensis* Murray, represented on the right of our Plate; others, larger-flowered, with purple petals with yellow eyes and black honey-guides, sometimes becoming biennial, such as *V. tricolor* Linné, represented on the left of our Plate; and Alpine perennial varieties, such as *Viola lutea* Hudson. In *V. tricolor* Linné the pollen falls upon the anterior petal, but there is a little door-like flap at the lower edge of the stigmatic hollow. A visiting bee can bring pollen from another flower which will fall into the hole; but as it leaves the flower, after sucking the honey from the spur, it must so close this flap that the flower's own pollen cannot get to its stigma. The smaller-flowered *V. arvensis* Murray, in which, as is seen on our Plate, the petals are shorter



PANSIES—continued.

than the sepals, has no such flap to protect its stigma, and sets seed readily with its own pollen.

Improving readily under cultivation, *Viola tricolor* has long been a garden favourite, and its staring, face-like, and apparently three-lobed corolla has earned for it an immense variety of nicknames, one at least of which has acquired poetical associations to which it seems to have had originally no claim. *Herb Trinity*, which occurs in Spanish as *Trinitaria*, and the rustic *Three-faces-under-a-hood* are obviously suggested by the form of the corolla in the wild form, before the florist had insisted that its outline should be circular ; but *Johnny-jump-up* (which is still commonly used both in Scotland and in the United States), *Jump-up-and-kiss-me*, *Kiss-me-behind-the-garden-gate*, and the many variants on the same theme, all, no doubt, also are suggested by the pose, conspicuousness, and curious aspect of the varying blossoms. The more sentimental names would seem, however, to have had a more prosaic origin. *Heartsease* is said to have meant in the first instance simply a drug found efficacious in cardiac affections, such as the Clove or its cheaper substitute the Clove Carnation or Gillyflower. The Wallflower being also known by the name Gillyflower was at one time called *Heartsease* ; and Dr. Prior suggests that

“as the wallflower and the pansy were both comprehended among the Violets, that of *Heartsease* seems to have been transferred from the former to the species of the latter now called so.”

The French *Pensée* is said to have been formerly *Menues pensées*, idle thoughts, and is, of course, the original of our *Pansy*. As Ophelia says :—

“There is Pansies—that’s for thoughts” ;

and this has become *Paunce* and *Fancy*, the thoughts being supposed to be those of remembrance.

Among the many allusions to this flower in the poets none is more pithily descriptive than “the pansy freaked with jet” of Milton’s “*Lycidas*.” A modern American poetess has thus happily summed up the suggestions :—

“I send thee pansies while the year is young,
Yellow as sunshine, purple as the night ;
Flowers of remembrance, ever fondly sung
By all the chiefest of the Sons of Light ;
And if in recollection lives regret
For wasted days and dreams that were not true,
I tell thee that ‘the pansy freak’d with jet,’
Is still the heart’s-ease that the poets knew.
Take all the sweetness of a gift unsought,
And for the pansies send me back a thought.”

CLXXVI.—THE SPURGE LAUREL.

Daphne Laureola Linné.

THE Order *Thymeleales* is a comparatively small one, comprising some six hundred species in less than fifty genera and in five Families, three of which are exclusively African. They are mostly woody plants with simple leaves and a somewhat reduced type of flower, so that their exact position in the series, their nearest affinities, that is, are not quite clear. The flowers are cyclic and polysymmetric, with a perianth of one or two whorls and one or two whorls of stamens, generally carried up on a receptacular tube, so as to be practically perigynous. This tube is free from the superior syncarpous gynæceum of from two to four carpels. The three British representatives of the Order belong to the Families *Thymelæaceæ* and *Eleagnaceæ*, the *Daphne* and *Oleaster* Families, as they may be called, two belonging to the genus *Daphne* in the former, and the third to *Hippophaë* in the latter.

The Family *Thymelæaceæ* comprises five-sixths of the entire Order. Confined to Tropical and Temperate regions, it seems to belong mainly to the southern parts of the Old World. Most members of the Family are shrubs or undershrubs, and they are remarkable for the very tough bast of their stems. This is especially exemplified in the Lace-bark tree of Jamaica (*Lagetta Lintearia* Lamarck), the inner bark of which is used for cordage, whips, or, when pulled out under water, for lace. The leaves are scattered, exstipulate, and entire ; and the flowers are usually perfect and tetramerous or pentamerous, and in many cases are brightly coloured, sweet-scented, and honeyed. The perianth, united below in the tube of the receptacle, which is of varying length, often consists of four similar leaves which are so folded in the bud that two are outside both edges of the inner two. The epiphyllous stamens when equal in number to the lobes of the perianth appear to alternate with them ; but when, as in *Daphne*, double their number, are in two series, those in the upper of which are opposite to the perianth-lobes, those in the lower alternate with them. The ovary is generally one-chambered, with one pendulous anatropous ovule and one style ; and gives rise to a generally indehiscent fruit, either dry or succulent. The bark and fruit of many species in the Family are bitter, acrid, vesicant, and purgative, containing the poisonous mezerinic acid ; and, though they have been much used formerly in medicine and still appear in lists of officinal plants, are dangerous remedies.

The genus *Daphne*, one of the larger genera of the Family, comprises some fifty species, natives of Temperate Asia, Europe, and North Africa. They are mostly low-growing shrubs with tetramerous flowers, a deciduous perianth, eight included stamens, a short style, and a fleshy fruit. The flower is homogamous, so that self-pollination is possible ; but honey is secreted by the base of the ovary and the flowers are generally fragrant, so that insect-pollination is the rule. The receptacular tube may be short, when it is adapted to the visits of flies ; rather longer, when bees are the pollinating agents ; or longer still, an adaptation to butterflies.



THE SPURGE LAUREL—continued.

Paper is made from the inner bark of several Indian species ; and the bark, leaves, and berries of European forms have been used in popular medicine as purgatives and emetics, whence *Daphne Gnidium* Linné, of the Mediterranean area, is known as Spurge Flax ; *D. Mezereon* Linné, one of our garden favourites which occurs, though very rarely, wild in this country, as Spurge Olive ; and our commoner *D. Laureola* Linné as Spurge Laurel. Thus Chaucer in the “Nonnes Preestes Tale” mentions “Laureole” among laxatives, and Turner in his “Names of Herbes” writes :—

“Daphnoides called of the commune sort Laureola, in englishe Lauriel, Lorel or Loury, groweth plentuously in hedges in England, and some abuse the seede of it for coccognidio.”

Many hardy European species, and others, more tender, from Asia, are valued in our gardens and greenhouses as early-flowering and sweet-scented flowers. Linné, however, writes disparagingly of our Spurge Laurel that it is “sad in colour, ungrateful in scent, and blossoms in a gloomy season.” Its average date of flowering is February 6th ; but we have found it in blossom on the outskirts of Salisbury Plain as early as December 26th. The yellowish-green flowers hanging in racemes below the terminal rosettes of glossy leaves would, it is true, not be noticed for beauty at any other season ; but their honeyed fragrance has never seemed “ungrateful” to us.

Both this species and the rarer pink-flowered *D. Mezereon* are confined in a wild state to calcareous soil ; and neither species extends into Scotland or Ireland. Dr. Moss enumerates them among “the large number of associated species of trees and shrubs” in ash-woods on such soil, together with Linden, Spindle-tree, White-beam, Privet, Dogwood, Wayfaring-tree, Yew, and Juniper. While *D. Mezereon* has its fragrant pink flowers all along its stems in the axils of the fallen leaves of the previous year, and has red berries, the leaves of the Spurge Laurel are more confined to the summit of its stem and are evergreen, while the greenish blossoms are followed by black fruit.

The name *Daphne* reminds us of the poetic fancy of ancient Greece which peopled every stream and grove with nymphs and dryads. When the sunshine glittered on a swift mountain torrent as it hid itself in the evergreen recesses of some wooded glen, the sun-god Apollo seemed to pursue the swift-footed Daphne, daughter of the river-god Peneus, and the other gods, in answer to her prayer for aid, turn her into one of the laurels whose roots in the warm and superficially dry calcareous soil were watered by her percolating stream. As a generic name *Daphne* dates from Dioscorides, and *Laureola*, a diminutive of *Laurus*, from Dodoens.

CLXXVII.—THE SEA BUCKTHORN.

Hippophaë Rhamnoides Linné.

THE Oleaster Family, or *Elæagnaceæ*, are quite a small group of shrubs, mostly belonging to the dry steppes or salt-saturated coasts of the Northern Hemisphere. They are for the most part copiously and often spinously branched, and have somewhat leathery, entire, exstipulate leaves. Both stems and leaves are covered with scales, which are truly hairs, being modified processes of the superficial cells. The flowers are arranged racemosely and may be perfect or unisexual, their parts being in twos or fours. In perfect or carpellate blossoms the floral receptacle is tubular, as in the allied *Thymelæaceæ*, but it is sometimes adherent to the ovary. There are no petals: the stamens may, as in *Thymelæaceæ*, equal the sepals in number, or be twice as many; and the one carpel contains, as in that Family, one anatropous ovule; but it is erect, rising, that is, from the base of the ovarian cavity, and not pendulous. The fruit is succulent.

The Family includes the Oleasters (*Elæagnus*), from which it takes its name, the North American Buffalo-berries (*Shepherdia*), and the Sea Buckthorns (*Hippophaë*), the first-named genus comprising two-thirds of the species in the Family. All three genera have species with edible fruit, nor are there any strong medicinal or in any way dangerous properties in any of them. The fruits are indehiscent, and the pericarp becomes hardened, but is enclosed by the perianth which is persistent and juicy, thus constituting a false drupe.

The name *Hippophaë* dates from Dioscorides, and is apparently derived from the Greek ἵππος, *hippos*, a horse, and φάω, *phao*, I shine; but, though the silvery scales give the plants a lustre which justifies the second half of the name, the prefix *hippo-* has not been satisfactorily explained, nor is it quite clear that these were the plants originally intended by this name. They are spinous shrubs, shining with a silvery sheen from the stellate scaly hairs with which they are covered. These hairs make a very pretty object under the microscope. The leaves are scattered and are comparatively small, less than two inches long, at the period of flowering, but lengthen to half as long again later. Obovate at first, they become lanceolate, and, a dull green above, they are silvery on their under surfaces. The flowers, which appear in May, are diœcious and spring from the old wood. The male flowers, which are minute, are in axillary catkin-like bracteate clusters, each ovate bract having in its axil one flower, consisting of two sepals and four stamens, the latter having very short filaments and yellow anthers. The sepals adhere at their tips so as to protect the pollen against rain; but in dry weather they separate at their sides, so that the pollen can be blown out by the wind. To secure plenty of the beautiful orange berries on the carpellate bushes it is necessary to plant male shrubs near by. Pollination can, however, be readily carried out by hand.



THE SEA BUCKTHORN—continued.

The carpellate flowers are solitary and consist of a tubular two-lobed calyx which ultimately forms the orange-yellow berry. The style is short ; but, as is usual in wind-pollinated flowers, the stigma is long.

The fruits ripen in September or October, when they are about half an inch in diameter. They have the smell of rotten apples and a slightly acid taste, and are not eaten by birds until other berries are gone. Children often eat them and they are perfectly harmless. An amusing instance of modern belief in the doctrine of signatures is recorded. "A woman had the jaundice and said that she thought perhaps that's what the yellow berries was sent for—they must be sent for something—so she took some to try, but they did her no good nor yet no harm."

Hippophaë Rhamnoides, the specific name of which merely suggests its likeness in habit to the Buckthorn (*Rhamnus catharticus* Linné), is unquestionably indigenous on the east coast of England, where it often forms a prominent feature in what ecologists term the "fixed dune association." From four to six feet high, it constitutes, with Elder, Dwarf-Willow, and pink-flowered Brambles (*Rubus discolor* Weihe and Nees), a dense scrub on the poorest of sand. It will grow perfectly well, however, away from the sea and repays cultivation in good garden soil. It has become naturalised in various parts of Scotland and Ireland ; but is not there indigenous. When well established it produces numerous suckers which can be detached with roots to form new plants ; or it can be propagated by layers or cuttings during the summer, or from seed.

As might be expected, it is only in Norfolk, where the plant is specially frequent in a wild state, that it can be said to have any true popular name. *Sea Buckthorn*, *Sallow-thorn*, and *Willow-thorn* are practically merely book-names ; but the fisher-folk of the Norfolk coast are said to call it *Wyvables*, *Wirwivole*, or *Wyrviole*, though when asked what the word meant they could only say, "It means nothing—it is only the name we know for it."

A closely allied species *Hippophaë salicifolia* D. Don extends northward from the Himalaya and is stated by Mr. Ernest Wilson to grow from thirty to fifty feet or more in height with a girth of from four to ten, or even twelve or fifteen, feet in the forests on the Chino-Tibetan border. In that region it frequently occurs amid the shingle and boulders of dry water-courses—a situation not very dissimilar to that of its humbler European representative.

Lord Avebury describes the caterpillar of a hawk-moth as feeding upon the leaves of our species and as being rendered inconspicuous by orange patches curiously resembling the fruits in size and colour ; but the orange spots on the green larva of *Deilephila hippophaes*, which must be the species referred to, are quite minute and would, therefore, not have any such mimicking effect.

CLXXVIII.—THE PURPLE LOOSESTRIFE.

Lythrum Salicaria Linné.

THOUGH only represented in England by three Families, numbering between them some seven genera and little more than twenty species, the Order *Myrtifloræ*, which nearly corresponds to Bentham and Hooker's Cohort *Myrtales*, is an extensive group, better represented, however, in the Tropical and Warmer Temperate Zones.

The Order includes both herbaceous and woody plants, mostly with opposite, simple, entire leaves ; polysymmetric, cyclic, heterochlamydeous, perfect flowers ; a tubular receptacle usually adherent to the ovary ; stamens equal in number to the petals, or twice as many ; and two or more united carpels with a single style.

The great Family *Myrtaceæ*, with about two thousand species, is mainly tropical and has no British representatives ; and the yet more numerous *Melastomaceæ* are even more exclusively tropical. Our three British Families are the *Lythraceæ*, *Onagraceæ*, and *Haloragidaceæ* ; and the first of these—a considerable Family with conspicuously flowered trees and shrubs, such as *Lagerstroemia*, in warmer regions—is represented with us by the little Water Purslane (*Peplis Portula* Linné) and by two species of the genus *Lythrum*. The members of the Family have generally opposite leaves with minute stipules ; flowers in racemes or spikes of verticillasters, usually tetramerous or hexamerous ; the receptacular tube free from the ovary ; the calyx furnished with a stipular epicalyx, much as in *Potentilla* ; the sepals valvate and the petals crumpled in the bud ; the stamens perigynous ; the ovules usually indefinite in number ; and the fruit capsular.

The genus *Lythrum* received its name, derived from the Greek *λύθρον*, *luthron*, gore, or blood mingled with dust, from Linnæus, with reference, of course, to the colour of the blossoms. It had previously been considered as one with the undoubtedly allied Willow-herbs, whence the specific name *Salicaria* (from *Salix*, a Willow) ; and these plants had in still earlier times been known as *Lysimachia* or Loosestrife, our common species *Lythrum Salicaria* being then known as *Lysimachia purpurea spicata*, Spiked Purple Loosestrife. Loosestrife or *Lysimachia*, from the Greek *λύσις*, *lusi*, loosing, *μάχη*, *mache*, battle, says Gerard,

"As Dioscorides and Plinie doe write, tooke his name of a speciall vertue that it hath in appeasing the strife and unrulinesse which falleth out among oxen at the plough, if it be put about their yokes : but it rather retaineth and keepeth the name *Lysimachia* of King Lysimachus the son of Agathocles, the first finder out of the nature and vertues of this herbe."

We do not now recognise any affinity between the Purple Loosestrife and the Primulaceous Yellow Loosestrifes which now bear the generic name *Lysimachia*.

Lythrum comprises some twenty species of shrubs and herbs, with square branches, axillary flowers which secrete honey, red petals, a long slender style, and a two-chambered ovary. Of our two British species, the rare *L. Hyssopifolia* Linné



THE PURPLE LOOSESTRIFE—continued.

has scattered leaves, solitary axillary flowers, which are all similar and have only six stamens. *L. Salicaria* Linné, on the other hand, is a much larger plant, often three or four feet high, with opposite, or sometimes whorled, leaves with a cordate base ; hexamerous flowers in a spike of sessile cymes or glomerules, just as in the Family *Labiata* ; and twelve stamens in two whorls of six. Three distinct forms occur, often growing side by side and in equal numbers. One of these—a large, coarse, downy plant with dull flowers—has a style shorter than either whorl of stamens : a second has the style intermediate in length between the two whorls of stamens ; and the third, a slender, glabrous plant with narrow leaves and bright flowers, has the style longer than all the stamens. The long stamens in the first two forms have green anthers, the others being yellow : the longer the stamens the larger are the pollen-grains in their anthers ; and the longer the style the larger are the papillæ of its stigma. Darwin showed by experiment that the species does not set seed if insect visits are prevented, and that in a wild state it is mainly cross-pollinated by a bee *Cilissa melanura* ; and he was the first to explain the trimorphism, or, as it is now termed, trimorphic heterogony of the species. The position of the two rows of stamens and the stigma in either form corresponds to that of the head, thorax, and abdomen of the bee ; and most fertile seed is obtained when a stigma is pollinated with pollen from a stamen of the same length as its style, *i.e.* from one of the two other forms. Knuth suggests that the green anthers of the long stamens may serve as a protection against pollen-eating insects by appearing immature.

Though not the “long purples” of Ophelia’s garland, *Lythrum* is obviously the

“Gay long-purples with its tufty spike,”

of John Clare and the “long purples of the dale” of Tennyson. Where it grows with its yellow-flowered namesake, with Comfrey, Meadow-sweet, and Forget-me-not, it is often a strikingly beautiful feature in our river-side landscape. As John Davidson sings,

“that spies may never harass
In their baths
The shining naiads, purple arras
Of the loosestrife veils the paths.”

From English stream-sides the plant spread to Australia, where it has become naturalised ; and about 1870, a factory near the sources of the Walkill using Australian wool, the Loosestrife made its appearance on the banks of that American stream and in a few years had spread down stream to the Hudson and both up and down that river and its various affluents.

CLXXIX.—THE ROSE-BAY.

Epilobium angustifolium Linné.

THE *Onagraceæ* are a considerable Family, belonging mainly to Northern Temperate regions and mostly herbaceous. They take their name from *Onagra*, a pre-Linnæan name for the Evening Primroses, now known as *Ænothera*. Most of the species are perennials with exstipulate simple leaves, polysymmetric flowers with their parts in twos or fours, valvate sepals, contorted petals, and inferior ovary with a single style and central placentation. The tubular floral receptacle is generally prolonged as a "calyx-tube" beyond the region in which it is adherent to the ovary. The Family includes many ornamental genera of garden flowers, such as *Clarkia*, *Ænothera*, and, above all, *Fuchsia*; but has no medicinal or other applications of economic importance.

The genus *Epilobium* was so named by Conrad Gesner, from the Greek ἐπὶ, *epi*, upon, λόβιον, *lobion*, a pod, with reference to the epigynous character of the corolla, a character which, as a matter of fact, it shares with the other members of the Family. It includes upwards of a hundred and fifty species, twelve of which are British, besides a great number of natural hybrid forms. Most of them are herbaceous and perennial, with slender rooting underground stems or "stolons," which render them somewhat difficult plants to eradicate from gardens. The flowers are mostly pink or white, tetramerous, and polysymmetric, with a long "calyx-tube," deciduous sepals, bilobed petals, two whorls of four stamens each, differing in length, and a slender style. The fruit is a long four-chambered capsule dehiscing loculicidally and septifragally by four valves which coil back from above downward, leaving the numerous seeds attached to the central axis. The seeds are small, oblong, and brown, and are each surmounted by a tuft or *coma* of long silky white hairs which act as most effective aids to their dispersal by wind. Honey is secreted at the summit of the ovary, and in wet weather the long ovaries bend, so that the flowers droop and their pollen is thus protected from the rain.

Among the British representatives of the genus there is a considerable range of difference in the size of the flowers and in the time of maturation of anthers and stigmas with reference to cross- or self-pollination. The Rose-bay (*Epilobium angustifolium* Linné) has large flowers in which autogamy, *i.e.* self-pollination is almost impossible. It represents a section or sub-genus to which Scopoli gave the appropriate name *Chamænerium* or Dwarf Oleander, from the Greek χάμαι, *chamái*, on the ground, and νήριον, *nerion*, oleander. The species of this group have no "calyx-tube," the sepals being divided down to the summit of the inferior ovary: their petals are unequal, the two anterior ones being smaller than the posterior two, so that the flower is zygomorphic or monosymmetric: both stamens and style ultimately bend over so as to hang downwards from the centre of the vertically placed blossom; and the leaves are scattered. Rose-bay was the first plant in which



THE ROSE-BAY—continued.

Christian Conrad Sprengel, whose work on cross-pollination was published in 1793, observed the phenomena of dichogamy. He found the flowers strongly protandrous. When they open, soon after sunrise, the anthers are already ripe and the filaments project horizontally, whilst the style with the four lobes of its stigma closed together is bent downwards. The lower parts of the filaments are flattened and bear hairs which serve to protect the honey within the space between them and the style from rain. Visiting insects clasp the stamens and the lower petals, and thrust their tongues between the filaments. When the pollen has been shed, the stamens bend downward and the style upward, while the four stigmatic lobes spread apart, taking the place previously occupied by the anthers. Such was Sprengel's observation, and when these arrangements occur, self-pollination will apparently be wellnigh impossible. Other observers, however, have found the flowers less protandrous. Schultz found that in mountainous regions the plant was less protandrous than in the lowlands; Baron Kerner von Marilaun found that, in the absence of insect visits, self-pollination is sometimes possible; and Warming even found protogynous flowers.

The tall unbranched stems of this species, often deeply tinged with red and reaching a height of from two to six feet, when surmounted by the handsome tapering raceme of loosely arranged rose-pink blossoms naturally attracts attention in our August woodlands; and the lanceolate leaves, often glaucous on their under surfaces, suggest the obvious comparison to a Willow or Sallow, whence such popular names as the North of Ireland one, *Blooming Sally*, have originated. The plant has become much more abundant of late years, especially in moist places in woodlands; but even establishing itself on vacant building sites in the heart of the metropolis. Often securing the first footing after a forest fire, it has acquired the name *Ildmarke* in Denmark and *Fire-weed* in America. When less familiar, it was, perhaps, its delicate beauty which suggested an exotic origin and gave it such names as *Tame Withy*, and *French* or *Persian Willow*. There are, however, two varieties, one of which, *E. macrocarpum* Stephens, with capsules over two inches in length, has more claim to be considered indigenous than the other, *E. brachycarpum* Leighton, the common garden form, in which the pod is only an inch long. This latter often occurs as an escape.

CLXXX.—THE GREAT WILLOW-HERB.

Epilobium hirsutum Linné.

THE other British species of *Epilobium* have opposite leaves at least on the lower part of their stems, though the upper ones are often scattered. Their flowers are polysymmetric: there is a "calyx-tube" extending above the inferior ovary, and their stamens and style are erect. They differ much in size: in their stems, which may be round or more or less tetragonal in section, in the size and depth of tint in their flowers, and in their stigmas, which may be four-cleft or entire; but are often extremely difficult to discriminate. They vary considerably in many of their characters; and where two species grow near to one another they frequently hybridise. Small-flowered forms, especially if pale in colour, are generally homogamous, are seldom visited by insects, and set seed freely as a result of self-pollination; but these are characters in which the individuals even of a single species often differ, more especially in different localities.

Epilobium hirsutum Linné is a tall handsome plant, from three to six feet high. It produces thick, fleshy underground suckers, bearing a few leaf-scales or rosettes of leaves, and the sub-aerial stems are slightly branched, terete, and downy. The hairs from which the species gets its appropriate name *hirsutum* are of two kinds, some long and spreading and others glandular, rendering the plant somewhat viscid and, perhaps, producing the perfume which is most noticeable when the leaves or young shoots are bruised. The leaves are from three to five inches long, oblong-lanceolate, clasping the stem and decurrent down it in narrow wings, finely toothed, and most hairy along their veins. The abruptly pointed flower-buds stand erect and expand in July or August into handsome, deep rose-pink blossoms which vary in diameter from a quarter of an inch to upwards of an inch, varying also in the period of maturity of their essential organs. The sepals are lanceolate and the petals broad and notched: the filaments are hairy at their bases, and the four large white stigmatic lobes, which are revolute, form a conspicuous feature in the flower. Flowers exclusively female, in which the anthers produce no pollen, occasionally occur; and three different forms of perfect flowers have been described, viz. small homogamous ones that are self-pollinating; medium-sized flowers which are homogamous or slightly protandrous, with an erect pistil, in which case self-pollination is at least possible; and large, markedly protandrous blossoms with a long style hanging out of the flower, so that self-pollination is precluded. The capsules are from two to three inches in length. Henry Lyte, in his translation of Dodoens's Herbal, referring to the stout inferior ovary, says that this species

"is called of some, in Latine, *Filius ante Patrem*, that is to say, the sonne before the father, bycause yt has long huskes in which the seede is contained do come forth, and waxe great, before that the floure openeth."

Most of our English popular names for this species refer, however, to the perfume which exhales from the blossoms, especially in warm sunny weather, as well



THE GREAT WILLOW-HERB—continued.

as from the bruised leaves or shoots. This sweet but slightly acidulous smell suggests, we are told by Messrs. Britten and Holland, a *Gooseberry Pie* in Suffolk, a *Gooseberry Pudding* in Sussex, a *Cherry-pie* in Dorset, and a *Plum-pudding* in Cheshire ; but it is more universally compared to boiled, stewed, or otherwise cooked apples. Thus *Apple-pie* is a very general name, and Richard Jefferies, in his "Round about a great estate," says of it—

"The country folk call it the sod-apple, and say the leaves crushed in the fingers have something of the scent of apple-pie."

This too is the signification of the very general and pretty name *Codlins and Cream*, for a coddling apple was originally an unripe one that required cooking to make it fit to eat, to *coddle* meaning to boil or stew lightly.

In Guernsey the rosy four-petalled flower suggests a Stock, so that, as this species grows commonly by streams or ditches in moist meadows and not on sea-cliffs, it is there known as *Violette de prai*, the Meadow Stock.

As in the case of the Rose-bay so also in this species there is a very beautiful white-flowered variety. We remember finding considerable masses of it, with the common pink-form, some years ago beside the estuary of the Thames between Leigh and Southend. As the filaments, anthers, and styles in these forms retain their pink colour they are very effective.

In a wild state the Great Willow-herb is not particular as to sub-soil and seems at least equally luxuriant in stagnant waters with *Phragmites* or the Loosestrifes as by the sides of slowly-running streams. A broad mass of its dense leafage bearing aloft a sheet of its bright flowers is often a beautiful object beside some half-choked pond ; but perhaps the plant is likely to be even more appreciated when a few plants occur here and there beside the brook that meanders through the meadows, mingling its deep rose-coloured flowers with the creamy masses of the Meadow-sweet or the rigid candelabra of the Figwort, or amid a tangle of Yellow Vetchling and Purple Vetch.

It is too coarse-growing a plant for ordinary garden cultivation, and, like most of its congeners, is too luxuriant in its underground extension to be safely so employed ; but if planted by the pond-side to break the line of bank it is not only in its element but is a distinct addition to the charming possibilities of water-side vegetation.

CLXXXI.—ENCHANTER'S NIGHTSHADE.

Circæa lutetiana Linné.

JUST as a building constructed with purely utilitarian plans may become mellowed by age to much beauty and surrounded with any number of interesting historical associations, so the names of plants originally most prosaically matter-of-fact may in course of time acquire much poetical suggestiveness. Thus when we see the tiny dead-white blossoms of *Circæa lutetiana* Linné showing conspicuously against the dense shadow of some wooded glen we can imagine its generic name and the English *Enchanter's Nightshade* to be fully justified by the weirdly gloomy surroundings amidst which it grows, though it would seem, as a matter of fact, that these names represent a long series of blunders, mistaken identifications, superstitions, and impostures.

The name *Circæa*, or rather its Greek equivalent *Κίρκαια*, *Kirkaia*, was used by Dioscorides

“because Circe, an Enchantress expert in herbs, used it as a Tempting-powder in amorous concerns.”

It was said to be the plant with which she bewitched the companions of Ulysses and to be used, with that precedent, in the compounding of love-philtres. Gerard, however, writes of it :—

“There is no use of this herbe either in phisicke or chirurgerie that I can read of, which hath happened by the corruption of time, and the errour of some who have taken Mandragoras for Circea, in which errour they have still persisted unto this daie, attributing unto Circea the vertues of Mandragoras.”

These “vertues of Mandragoras,” real and imaginary, carry us back to the very dawn of medicine. *Mandragora*, a near ally of *Atropa Belladonna*, is poisonous, emetic, purgative, and narcotic, but was much used in ancient times as a sedative, as appears from Shakespeare's classing it with “the drowsy syrups of the world” in “Othello.” Its tap-root, however, is often forked, so as to present a faint resemblance to the legs of a human being ; and it is an evidence of the great antiquity of the doctrine of signatures that the use of the plant as a love-philtre, suggested by this resemblance, appears in the Book of Genesis, Leah's *dudaim* being undoubtedly the Mandrake. Pythagoras called the plant “Anthropomorphos,” “the form of a man,” and Columella spoke of it as *semi-homo*, half-human. Josephus gives the entire fable that he who uproots the plant dies incontinently, and that, therefore, a dog was tied to it to pull it out of the ground ; and in the beautiful fifth-century manuscript of Dioscorides at Vienna, Euresia, Goddess of Discovery, is depicted presenting the very human-looking root to Dioscorides, while the dog is dying beside her. Many early herbals denounced these “ridiculous tales . . . whether of old wives or some runagate surgeons or physicke-mongers,” as Gerard calls them, as also the addition that

“it is never or very seldome to be found growing naturally but under a gallows, where the matter that has fallen from a dead body hath given it the shape of a man.”



ENCHANTER'S NIGHTSHADE—continued.

The superstition, fostered by elaborately improved specimens, still lingers ; and *Circea* is to this day known as *Mandrake* in Devonshire.

Nightshade is also explained by Dr. Prior as originating in a mistake, the Latin *solatrum*, an anodyne, being mistaken for *solem atrum*, a black sun, *i.e.* an eclipse or a shade as dark as night.

As for *lutetiana* it merely signifies “muddy,” the dull green foliage of the plant being often plastered with mud from the woodland rivulets beside which it grows.

The six or seven North Temperate herbs that constitute the genus *Circea* have creeping rhizomes which render them troublesome weeds in gardens. Their stems, slightly swollen at the nodes, and their opposite, stalked leaves more nearly recall those of their beautiful allies the Fuchsias than do those of any other British plants. They are slightly toothed and, as in other plants in the Family, are full of *raphides*, needle-shaped crystals of calcium-oxalate lying side by side in bundles of twenty or so in a cell, and so long as to be visible to the naked eye if the leaf be deprived of its chlorophyll.

In *C. lutetiana* Linné the whole plant is slightly pubescent with glandular hairs. Its flowers are borne in loose terminal racemes with very slender peduncles and pedicels : they are but an eighth of an inch in diameter ; but are remarkable for their completely dimerous symmetry. The two sepals spring from a short tube above the inferior ovary, which serves to hold the honey : the two white petals, alternating with the sepals, are deeply divided into two broad lobes ; and the two stamens, inserted under the epigynous honey-secreting disk, are at first widely divergent from the slender central style.

The slender flower-stalks at first spread out horizontally ; but they are distinctly articulated at their bases and after fertilisation bend downwards. The anthers mature before the two-lobed stigma, and cross-pollination by flies sometimes occurs ; but, if not, the stamens curve towards the stigmas and self-pollination takes place.

The inferior ovary is covered with hooked hairs which become stiff and bristle-like in the fruit stage, so that it is in fact a small bur. It is obovoid, two-chambered, and indehiscent, each chamber containing a single seed.

Though tolerant of much shade and not particular as to sub-soils, this species occurs most abundantly and luxuriantly in places where the foliage canopy is comparatively thin, and in such situations it is, like the Dog's Mercury (*Mercurialis perennis* Linné) and the Wood Sanicle (*Sanicula europæa* Linné), locally the dominant species.

CLXXXII.—THE COMMON MARE'S-TAIL.

Hippuris vulgaris Linné.

AS is commonly the case with aquatic plants, the vegetative structures of the *Haloragidaceæ* are in many of its species so specially adapted to the environment, and the floral organs are of so reduced a character, that it is not easy to determine the nearest affinities of the Family. Although Bentham and Hooker considered the valvate calyx and inferior ovary but slight indications of relationship to the *Onagraceæ*, and preferred to place the Mare's-tail Family in the Order *Rosales*, Eichler, Warming, and Engler all agree in placing it among the *Myrtifloræ* and in considering it undoubtedly a series of reduced forms related to *Onagraceæ*.

A small Family of less than a hundred species, the *Haloragidaceæ*, as again is frequently the case with aquatic plants, are practically cosmopolitan, though better represented in the South Temperate Zone than elsewhere. Most of them are herbaceous and live either in or near water. *Haloragis*, the largest genus, comprising as it does some fifty species, is mainly Australasian, and consists of large herbaceous plants living in damp situations; whilst several South American species of *Gunnera*, though equally herbaceous, have enormous Rhubarb-like leaves several feet across which make them most valuable as ornamental plants by the water-side. The two genera which are represented in Europe are *Myriophyllum* and *Hippuris*. The Water-Milfoils (*Myriophyllum*) are so called, from the Greek *μυρίος*, *murios*, innumerable, *φύλλον*, *phullon*, a leaf, and from the Latin *mille*, a thousand, *folium*, a leaf, on account of their finely-divided submerged leaves. Their inflorescences rise above water and the pollen of their small inconspicuous blossoms is carried by wind. From one species of this genus which abounds in the waters of Lake Titicaca on the confines of Bolivia and Peru, at an altitude of over 12,000 feet, the Indians construct rafts and sails; but there are very few useful purposes to which any of the *Haloragidaceæ* are applied. The flowers of *Myriophyllum*, like those of *Haloragis*, may be complete and perfect, with four sepals, four petals, two, four, or eight stamens, and four carpels; but the petals are sometimes absent and the flowers are often monœcious. *Hippuris* is, perhaps, monotypic, plants from the various distant regions in which it is represented, such as Australia and Fuegia, presenting no constant differences from our British species, *H. vulgaris* Linné. With its superior calyx represented by two rudimentary sepals, with no petals, one stamen, and one carpel, its flower is obviously much more reduced from the type of the *Onagraceæ* than the tetramerous *Myriophyllum* or the dimerous *Circea*.

The Family *Haloragidaceæ* as a whole may be characterised as aquatic or semi-aquatic herbs, with exstipulate and generally whorled leaves, inconspicuous flowers, often apetalous or monœcious, tetramerous, dimerous, or still further reduced, with a superior calyx, an indehiscent, inferior, capsular fruit, and one seed in each of its one to four carpels.



THE COMMON MARE'S-TAIL—continued.

Hippuris is a glabrous plant with a creeping rhizome and erect, unbranched, jointed, tapering shoots bearing whorls of from six to twelve narrow entire leaves and minute sessile flowers, one in the axil of each of the upper leaves. The rhizome is buried in the mud and the shoots rise above water, so that, as in *Myriophyllum*, the flowers can be wind-pollinated. The plant sometimes occurs in running water, when it is wholly submerged and flowerless. The leaves, when short, terminate in a stiff, hard tip; but in deep or running water they elongate, sometimes nearly to a foot in length, becoming at the same time flaccid and translucent with no hard tip. Internally, the stems have the central vascular axis and numerous air-spaces characteristic of submerged aquatics in general; and whilst the short thick leaves above water have a cuticle, stomata on both surfaces, palisade-tissue, and several vascular bundles, the thinner and paler submerged ones have neither stomata nor cuticle, much less mesophyll, with no distinct palisade-tissue, and with but one vascular bundle. The calyx is an obscurely two-lobed ridge round the upper part of the inferior ovary: the stamen has a red anther; and the style is tapering, pointed, and stigmatiferous throughout its length.

This Flowering Plant presents so much superficial resemblance to the Horsetails (*Equisetum*), which are allied to the Ferns, that it is not surprising that their names have been constantly interchanged. The name *Equisetum*, from the Latin *equus*, a horse, and *seta*, a hair, is used by Pliny; but Dodoens gave to the same cryptogamic plants the name *Hippuris*, from the Greek ἵππος, *hippos*, a horse, οὐρά, *oura*, a tail, which Linné took for the Flowering Plant. Gerard and other herbalists called this latter *Cauda equina femina* or *Female Horse-tail*, as being lower-growing than *Equisetum limosum* Linné, which may sometimes be seen growing side by side with it. Modern botanists, as Dr. Prior points out, have followed Hudson in shifting the hyphen, making *Female Horse-tail* into *Female-horse Tail*, i.e. *Mare's-tail*. When, however, Tennyson, in his "Aylmer's Field," writes of "The pretty marestail forest, fairy pines," he is, no doubt, thinking of the crowded societies of *Equisetum maximum* or the drooping *E. sylvaticum*, which resemble a pine-forest far more than *Hippuris* can ever do. So too such popular names as *Bottle-brush*, *Cal's-tail*, *Joint-weed*, and *Paddock Pipes*, i.e. Frog's-pipes, are bestowed upon both plants.

CLXXXIII.—THE WHITE BRYONY.

Bryonia dioica Jacquin.

SO far as the affinities of the Families of Flowering Plants can be represented by a regular sequence in a linear series, as it were, the arrangement of Dr. Engler has been here followed in the main. At this point, however, it seems better to the present writer to depart from it. Dr. Engler considers the Family *Cucurbitaceæ*, the Cucumber Family, of which the White Bryony (*Bryonia dioica* Jacquin) is the only British representative, to be nearly akin to the *Campanulaceæ*, and he accordingly places it in his highest and concluding Order, the *Campanulataæ*. Bentham and Hooker, Baillon, Eichler, and Warming, on the other hand, place it here, in the neighbourhood of the *Myrtifloræ* and *Umbellifloræ*, in an Order *Passiflorales*. This too is the place assigned to it by Messrs. Britten and Rendle in the table of the "Sequence of Orders according to recent views of affinity" which they appended to their "List of British Seed-Plants and Ferns" (1907); and, on this point, these authorities will be here followed.

The Order *Passiflorales*, named, of course, from the tropical or sub-tropical Passion-flowers (*Passifloraceæ*), may be characterised as largely herbaceous, often climbing by means of tendrils, with flowers usually polysymmetric, perfect, or unisexual, and a syncarpous ovary, usually one-chambered with three or more parietal placentas. It includes the urticating American Family *Loasaceæ* and, perhaps, also the *Begoniaceæ*, belonging chiefly to Tropical America, as well as the *Passifloraceæ*, which are well represented in that continent, and the *Cucurbitaceæ*.

This last-mentioned Family, though very widely distributed, is most abundant in tropical regions and is absent in the coldest zones. It comprises some eighty-seven genera and 650 species, mostly juicy, rapidly-growing, herbaceous plants, climbing by means of tendrils, with generally unisexual, pentamerous flowers having coherent sepals, petals, stamens, and carpels, and a gourd or *pepo*—inferior and horny externally when ripe—as fruit.

There has been much discussion as to the morphological nature of the tendrils of the *Cucurbitaceæ*, these climbing organs, which are sensitive to contact, mainly on the under surface of their hooked extremities, having been considered by various authors either as "roots, stems, leaves, stipules, shoots, flower-stalks, or organs sui generis." One of the most recent interpretations is that the non-sensitive base of each tendril is a branch, the sensitive apical portion a leaf: the absence of any articulation between them, and the apparent necessity of then considering the leaf as a terminal one, would seem to militate against this view. The unbranched character of these tendrils and the non-occurrence of flowers upon them tend to show that, unlike those of the Grape-vine, they are of a foliar nature. That, when they have clasped a support, they twine half their length in one direction and the other half in the reverse direction, with a kink in the middle, is a



THE WHITE BRYONY—continued.

mechanical necessity when a change in length occurs in a flexible structure fixed at both its ends.

The leaves of most *Cucurbitaceæ* are, like those of the White Bryony, scattered, exstipulate, palmately lobed, and rough, this roughness being probably the origin of the Norfolk name, *Cow's lick*, for this species, just as the dense covering of the whole plant with white hairs, especially in its younger condition, gives its name the prefix *White*.

The stamens throughout the Family are typically five ; but they are variously united, both in their filaments, which are often so joined as to appear as three, and in their anthers, which in *Bryonia* and many other genera are twisted together into an S-like curve. The soft berry of *Bryonia* is exceptional in not having the horny exterior typical of the gourd or *pepo*.

The genus *Bryonia* derives its name, which was employed by Dioscorides, from the Greek *βρύω*, *bruo*, I sprout, with reference to its rapid growth ; and it shares the translated form of this name with the equally quick-growing but otherwise unrelated Monocotyledonous Black Bryony (*Tamus communis* Linné). This latter species, climbing by twining, with glabrous polished shoots, may often be seen, clambering through a quickset hedge in early spring, side by side with *Bryonia*.

White Bryony has a large, turnip-like root-stock, yellowish, transversely wrinkled, and often forked, which, we are told by old-time writers,

"sometimes groweth to the bignesse of a childe of a yeere old, so that it hath been by some cut into the forme of a man, and called a mandrake."

This root has a nauseous, acrid, milky juice containing a dangerously cathartic bitter principle similar to that of the allied Colocynth (*Citrullus Colocynthis* Schrader), the poisonous Wild Cucumber of Gilgal mentioned in the Second Book of Kings.

The green-veined cream-coloured flowers are not conspicuous to our eyes ; but they secrete honey at the base of the perianth and are freely visited by short-tongued bees, especially *Andrena florea* Fabricius. As both plant and bee seldom occur in Scotland or in Wales, it has been suggested that the distribution of the one is dependent on that of the other ; and also that the flowers emit some special odour, or ultra-violet rays of light, perceptible to the senses of the insect, though not to ours. This latter suggestion is supported by Knuth's observation that the flowers have a powerful actinic effect upon photographic plates.

The globular scarlet berries contrasting with the yellow autumn leaves are readily distinguishable from the larger and more elliptical fruit amid the bronze-purple foliage of the Black Bryony.

CLXXXIV.—ANALYTICAL DRAWINGS OF THE VIOLET FAMILY AND THE DAPHNE, MYRTLE, AND PASSION-FLOWER ORDERS.

(*Violaceæ*, *Thymelæales*, *Myrtifloræ*, and *Passiflorales*.)

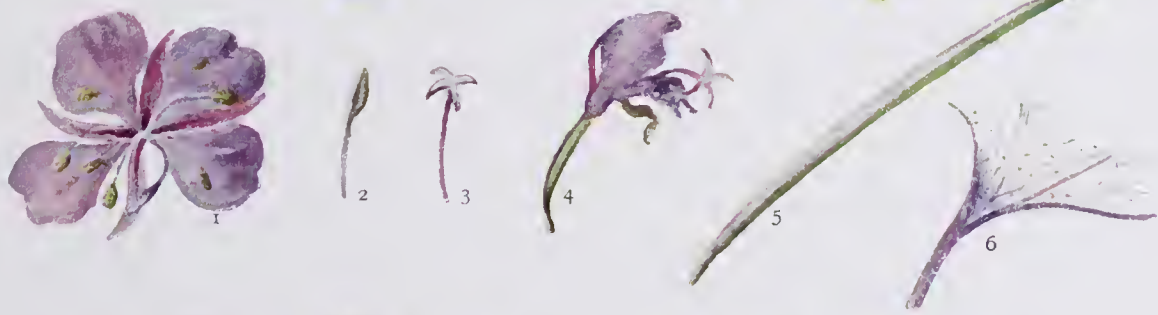
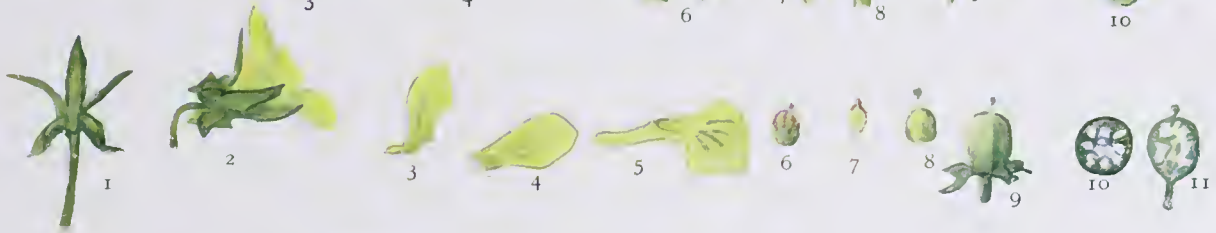
THE ten consecutive types analysed on this Plate are of very varied characters, alike in their general habits as plants and in the floral and fruit characters here represented. They include representatives of eight genera, belonging to seven Families and four Orders, the first three being species of the genus *Viola*, in the last Family of the Order *Parietales* to be enumerated among British plants.

The first line of figures represents the Sweet Violet (*Viola odorata* Linné), Fig. 1 being a flower, natural size ; Fig. 2, the three petals rendered anterior by the resupination of the flower, without the spur ; Fig. 3, the median petal ; Fig. 4, one of the lateral petals, showing the claw ; Fig. 5, the calyx and spur ; Fig. 6, the stamens, showing their orange connectives ; Fig. 7, one of the “tailed” stamens with its honey-secreting tail ; Fig. 8, the gynæceum ; Fig. 9, fruits ; and Fig. 10, a cross section of a fruit with unripe seeds.

The second line of figures represents the Pansy (*Viola tricolor* Linné), Figs. 1 and 2 being lateral petals, the former showing a green claw and honey-guides ; Fig. 3, the median petal, with more numerous lines of dark purple converging towards the spur at its base ; Figs. 4 and 5, the calyx, the latter showing also the essential organs, natural size, only the petals having been removed ; Fig. 6, the essential organs, magnified, showing the two tails of the stamens, the globular extremity of the style, and the stigmatic hollow ; Fig. 7, one of the tailed stamens seen from its anterior surface ; Fig. 8, the gynæceum ; Fig. 9, the fruit dehiscing, with its persistent calyx ; and Fig. 10, a cross section of an unripe ovary, showing the ovules radiating from three parietal placentas. Figs. 6 to 10 in this row are all enlarged.

The third line of figures represents the nearly allied Yellow Pansy (*Viola arvensis* Murray). Fig. 1 is the calyx, seen from below and somewhat enlarged, as are most of the other figures in this row. Fig. 2 is a lateral view of the flower, which well exhibits the auricles of the sepals. Figs. 3 and 4 are lateral petals ; Fig. 5, the median petal with its spur and honey-guides ; Fig. 6, the essential organs, natural size ; Fig. 7, a stamen ; Fig. 8, the gynæceum ; Fig. 9, the unripe fruit and persistent calyx, enlarged ; Fig. 10, a cross section, and Fig. 11, a longitudinal section, through the same.

The fourth and fifth lines of figures represent the two Families of the Order *Thymelæales*, the Daphne Family, *Thymelæaceæ*, as seen in the Spurge Laurel (*Daphne Laureola* Linné) in the fourth, and the Oleaster Family, *Elæagnaceæ*, as seen in the Sea Buckthorn (*Hippophaë Rhamnoides* Linné) in the fifth. In the former, Fig. 1 is a



ANALYTICAL DRAWINGS OF THE VIOLET FAMILY AND THE
DAPHNE, MYRTLE, AND PASSION-FLOWER ORDERS—continued.

flower as seen from above, natural size ; Fig. 2, the side view of one, with its bract ; Fig. 3, a flower opened, one of the four perianth-leaves being split, so as to disclose the two alternating whorls of epiphyllous stamens and the superior ovary, magnified ; Fig. 4, a fruit ; and Fig. 5, the same in longitudinal section.

In the fifth line, Fig. 1 is an enlarged view of a staminate flower, part of one of the two broad sepals having been turned back. Fig. 2 shows the same flower expanded and two of its four stamens. Figs. 3 and 4 show the female flower in an early stage with its tubular cloven perianth ; and Figs. 5, 6, and 7, the berry-like fruit, which consists, in fact, of a one-seeded nut enclosed in a fleshy orange perianth-tube.

The sixth line represents *Lythrum Salicaria* Linné, the Purple Loosestrife, which gives its name to the Family *Lythraceæ* in the Order *Myrtifloræ*. Fig. 1 in this line shows the flower, natural size, seen from below ; and Fig. 2, a somewhat enlarged longitudinal section through a flower of the medium-styled form, showing the honey-glands, superior ovary, and stamens in two whorls, one longer and the other shorter than the style. Fig. 3 shows the glandular calyx-tube, of which the alternate teeth are longer than the others, enclosing the essential organs, natural size ; Fig. 4, the gynæceum ; Fig. 5, a longitudinal section through an unripe fruit ; and Fig. 6, a ripe capsule dehiscing.

The Family *Onagraceæ* is represented by the seventh and eighth lines of figures, the seventh being the Rose-bay (*Epilobium angustifolium* Linné), and the eighth, the Enchanter's Nightshade (*Circæa lutetiana* Linné). In the former, Fig. 1 shows a flower, as seen from above ; Fig. 2, a stamen ; Fig. 3, the style and stigma ; Fig. 4, a side view of the flower in its later stage ; Fig. 5, the fruit ; and Fig. 6, one dehiscing and discharging the plumed seeds, all these figures being of natural size.

In the eighth line, Fig. 1 shows a flower of *Circæa*, seen from above, and Fig. 2, one in side view ; Fig. 3, an enlarged longitudinal section of the same ; Fig. 4, the ovary, calyx, and style ; Fig. 5, two deflexed fruits ; and Fig. 6, a fruit in longitudinal section, these three figures (4, 5, and 6) being of natural size. Fig. 7 is an enlarged transverse section of a fruit.

The ninth line represents the Mare's-tail (*Hippuris vulgaris* Linné), Fig. 1 being a young perfect flower ; Fig. 2, a pistillate one ; Fig. 3, a perfect one, showing both stamen and stigma fully formed ; Fig. 4, a fruit ; and Fig. 5, the same in section, all figures magnified.

The last line of figures represents the Cucurbitaceous *Bryonia dioica* Jacquin, Fig. 1 being a staminate flower seen from below ; Fig. 2, a female flower in side view ; Fig. 3, the style and stigmas in side view ; Fig. 4, the three bifurcate stigmas seen from above ; Fig. 5, a young berry ; and Fig. 6, the same in section. Figs. 3 and 4 are enlarged, whilst the rest are of natural size.

CLXXXV.—THE IVY.

Hedera Helix Linné.

THE Order *Umbellifloræ* takes its name from having the flowers usually in umbels. Their flowers are cyclic, heterochlamydeous, polysymmetric, and usually perfect ; with an inferior ovary of from one to fifteen carpels ; epigynous petals and stamens, the latter generally in a single whorl ; one, or exceptionally two, pendulous anatropous ovules in each carpel ; and seeds with a plentiful store of albumen. Three Families of very unequal size—the *Araliaceæ*, *Umbelliferæ*, and *Cornaceæ*—are comprised in the Order, nor is there any difference of opinion among botanists as to the near affinity of these three groups.

We call the *Araliaceæ* the Ivy Family after its only European species ; but its fifty other genera and four hundred species are mostly tropical. It agrees with the *Cornaceæ* and differs from the *Umbelliferæ* in consisting mostly of woody plants. These are trees or shrubs, many of the latter twining or climbing by means of adventitious roots ; and they are often downy with stellate hairs. Their leaves are scattered, have usually small stipules, and may be simple or compound ; whilst their flowers are individually small and usually pentamerous, with one ovule in each of the carpels and these generally five, or at least more than two, in number. Though generally greenish, not individually conspicuous, and homogamous or nearly so, the flowers secrete honey and are visited by insects. The fruit is a more or less fleshy drupaceous berry, differing from a true berry and from a true drupe, in having a tough endocarp to each carpel and in being polycarpellary and inferior.

The Family does not comprise the variety of powerful drugs and other useful plants that we have in the *Umbelliferæ*. Ginseng, the root of *Aralia Ginseng* Baillon, a native of Korea and Manchuria, is valued as the “life-giving root,” and sells for its weight in gold in China ; and Rice-paper is made from thin sheets of the pith of *Fatsia papyrifera* Benthams and *Hooker filius*, a native of Formosa.

The genus *Hedera*, the name of which is the Classical Latin for the Ivy, contains apparently only two distinct species. They agree in being climbing evergreen shrubs, with exstipulate leaves, five valvate petals, five stamens, five carpels, and united styles ; but the Australian *Hedera australiana* F. von Müller differs from our northern species in having pinnate leaves.

The Ivy (*Hedera Helix* Linné) is a native of the Northern Temperate region of the Old World from Japan and the Himalaya to North Africa, Ireland, and the Shetland Islands. An extremely variable plant, it may trail with long slender stems along the ground, rooting at the nodes but never flowering ; or, unable to stand alone, it may send out a crowded double row of unbranched roots along its internodes by which it climbs to the summit of a tree, a rock, or a building, and there at length produce its flowers and fruit. The stem of this climbing condition



THE IVY—continued.

may reach ten inches in diameter, so that on some old ruined walls we may see that, as Tennyson says,

“ monstrous ivy stems
Claspt the gray walls with hairy-fibred arms,
And suckt the joining of the stones, and looked
A knot, beneath, of snakes—aloft, a grove.”

Clinging thus to its support the Ivy has become an emblem of constancy, and in ancient Greece a newly-wedded couple were accordingly presented with an Ivy wreath. Though often mistaken for a parasite, the Ivy extracts no nourishment from any tree upon which it grows, though the mechanical constriction of its clasping stems may prove fatal to the supporting tree. How great may be the pressure it exerts in growth can be gauged from the fact that it has been known to deeply indent and flatten a thick leaden water-pipe. The climbing rootlets are strongly negatively heliotropic, so that they turn from the light towards the bark, rocks, or building into any crevices of which they will force themselves ; while if the stems themselves find their way between the joints of the masonry their expansion in growth may throw down long stretches of wall.

The leaves on the trailing and climbing parts of the plant are three- or five-angled, and lie so as to form a leaf-mosaic, capturing the maximum of their limited supply of sunlight ; but at the top of tree or wall the plant branches freely in a radial manner and bears ovate, single-pointed leaves which hang nearly vertically, or rather spread in various directions at right angles to the incidence of the light. The angular leaves of the lower part of the plant exhibit considerable variety in colouring, being often tinged with red, and with their veins prominently white or pale green.

In September or October, one of our latest plants to flower, the Ivy produces, exclusively from its upper free-branching region, its umbels of blossom. The peduncles are covered with stellate hairs and a few flowers are borne racemosely below the simple globular umbel. The five yellowish petals bend backwards as if to catch the least gleam of the October sun ; and the honey, freely secreted on the top of the ovary, proves more attractive to the insect world, to the Peacock, Red Admiral, and Painted-Lady butterflies, to wasps, bees, flies, and gnats by day, and to a variety of moths by night, than the sweetest of treacle or the strongest of rum that the entomologist may use as a lure. The flowers will not apparently set seed with their own pollen.

The greenish-black berries do not ripen till March or April, being unaffected even by severe frost. They are then largely eaten by starlings, thrushes, blackbirds, and the migrating ring-ousel ; but while the fleshy receptacular portion is digested, the lilac parchment-like endocarp enclosing the seed is not. The testa is folded in so as to produce a *ruminate* albumen, which does not occur in any other British plant, though well known in the Nutmeg.

CLXXXVI.—THE MARSH PENNYWORT.

Hydrocotyle vulgaris Linné.

THE Family *Umbelliferae* is not only by far the largest Family in the Order *Umbelliflorae*, but is one of the more considerable and most sharply defined groups of Flowering Plants. It comprises some 1,400 species in about 180 genera and is cosmopolitan in its distribution, although best represented in the North Temperate Zone. Thirty-five genera and fifty-eight species of the Family belong to the British flora, of which twelve, all belonging to distinct genera, are represented on this and the twelve following Plates.

Although generically and specifically difficult to discriminate, the plants of this Family present for the most part such marked general characters as to be easily recognised as such. They are mostly herbaceous, though often of considerable size : they have stout, often fluted, stems, of which at least the internodes become hollow by the rupture of the pith in their rapid growth ; and their leaves are generally scattered, exstipulate, sheathing at the base, and bi-, or tri-, pinnate. Their flowers are usually small, polysymmetric, pentamerous, white or yellow, perfect and grouped in compound umbels ; and they have usually an involucre of bracts at the base of the primary umbel and involucels or smaller secondary involucre below each of its umbellules or secondary—or, as they are often termed, partial—umbels. In some few genera, however, of which *Hydrocotyle* and *Eryngium* occur in Britain, the inflorescence is a simple umbel.

The superior calyx consists of five much-reduced sepals, of which the odd one is posterior : the five petals have usually inflexed points ; and there is one whorl of five stamens. The petals and stamens are epigynous, the receptacular tube being adherent to the inferior ovary, and honey is freely secreted from a fleshy epigynous disk. The flowers are markedly protandrous and are mainly cross-pollinated by flies.

The fruit is dry and consists of two united, one-seeded carpels placed antero-posteriorly, one at the back of the flower, that is, and one at the front, crowned by the fleshy epigynous disk and two distinct styles. In this type of fruit, technically known as a *cremocarp* or *inferior schizocarp*, the two carpels generally adhere by their flattened inner faces (which form what is termed the *commissure*) to a central axis or *carpopore*, which is often Y-, or V-, shaped ; and, when ripe, they break away from this, from below upward, separating into two one-seeded mericarps. These are each marked by vertical ridges, of which five, known as *primary ridges*, are more universally present and usually the more prominent, though there may also be four *secondary ridges* between them. In the pericarp or wall of the fruit there are often long narrow sacs called *vitte* containing coloured essential oil, generally situated in the *furrows* between the primary ridges, two of them, however, being commonly on the commissural surface or surface of contact of the two mericarps. There is only pendulous seed in each carpel, containing horny albumen, and it is important to notice whether



THE MARSH PENNYWORT—continued.

the seed is flat or grooved along the side facing the commissure. In the mericarp of *Carum Carui* Linné, commonly miscalled a Caraway-seed, whereas it is in fact half a fruit, the primary ridges are easily perceptible to the touch and distinguishable by the naked eye ; but in this very natural Family the genera can for the most part only be accurately discriminated by an examination of the number and relative development of the ridges and vittæ and the form of the seed, so that it is necessary to examine ripe fruits under a lens, preferably in cross section.

The Family has been divided into nine Tribes, six of which are represented in the British flora. The *Hydrocotyleæ* have their flowers in simple umbels and their fruit compressed *laterally*, i.e. in a direction parallel to the commissure, so that that surface of junction between the carpels is narrow. *Hydrocotyle*, the name of which was coined by Tournefort from the Greek ὕδωρ, *hudor*, water, and κοτύλη, *kotule*, a dish, with reference to its peltate leaves, is the only British genus in this Tribe, and is represented only by the one species, *Hydrocotyle vulgaris* Linné, which is more generally known as Marsh Pennywort than by any other popular name. The genus comprises some seventy species, all small perennial plants, mostly creeping, with the peltate and more or less entire leaves which distinguish them at once from the rest of the Family.

Our species has a long trailing stem, so that in marshy ground it is often massed together in broad patches. The leaves are erect, one or two springing from each node of the stem, and they are borne on slightly hairy stalks which are considerably longer than the peduncles. Their blades are glabrous, rather fleshy, nearly circular, doubly crenate, and from one to two inches across. The little axillary umbels hidden under the leaves consist of from three to six flowers, but very often elongate proliferously at the centre into a second cluster. As the individual flowers are almost sessile, the inflorescence is almost a capitulum rather than an umbel. The flowers are greenish or tinged with pink, and the little fruits consist of two much-flattened, nearly circular carpels, dotted over with reddish resinous points and with two ridges down each surface.

This harmless and rather ornamental little plant has suffered much opprobrium which can hardly be said to be altogether merited, being often known as *White Rot*, *Sheep-rot*, *Sheep-killing Penny Grass*, or *Flowkwort*, because it was supposed to produce rot in sheep. The explanation of this popular belief is that the liver-fluke, the parasitic worm that causes the fatal disease in question, passes one stage of its development in the bodies of small freshwater snails which live upon the leaves of various marsh-plants and are eaten by sheep with these leaves.

As might be anticipated in the case of such inconspicuous flowers as those of this species, self-pollination appears to be at least possible, since, although the flower is protandrous and the anthers open in succession, the stigmas are mature before the last of the five anthers bursts.

CLXXXVII.—THE SEA HOLLY.

Eryngium maritimum Linné.

THE Tribe *Saniculeæ* have either simple umbels or irregularly compound ones, and their fruits are almost cylindrical or slightly compressed dorsally, in a direction, that is, at right angles to the commissure, so that that lateral plane of junction between the carpels is broad. Their leaves are usually simple and palmatifid. We have two British genera belonging to this Tribe, besides *Astrantia*, one species of which, *Astrantia major* Linné, well known in gardens for its star-like membranous involucre, is found in an apparently naturalised condition in woods near Ludlow and Malvern. The two unquestionably indigenous genera are the rigid thistle-like *Eryngium* and the more slender *Sanicula*.

In spite of the popular names *Sea Holly* and its variants *Sea Holme* and *Sea Hulver*, the species of *Eryngium* are so thistle-like that we do not wonder at the names *Cardon d'banque*, literally "Sea-shore Thistle," bestowed upon *E. maritimum* Linné in Guernsey, and *Watling-street Thistle* applied to the rarer *E. campestre* Linné in Northamptonshire.

The beautiful glaucous hue of *E. maritimum* Linné, with the bluer veins of its leaves and the still deeper blue of the crowded heads of blossom, in delicate gradations of tone, contrasting with the banks of loose yellow sand amidst which it grows, have given the plant a fatal attraction in the eyes of every appreciative lover of the beautiful; so that the species is, perhaps, in greater danger of extermination nowadays for the decking of artists' studios than it was when its underground stems were rooted up for the manufacture of candy. How deeply the plant sends down the fleshy stolons given off by its creeping rhizome may be gauged from an old prescription for the making of "candied eryngo roots," which begins by directing that "the roots must be dug up from a depth of at least six feet." This was only the troublesome beginning of an equally laborious preparation, and it seems a method very likely to lead to extermination, so that we are not surprised to hear that the industry, which seems, in this country, to have been mainly confined to the neighbourhood of Colchester, died out chiefly from the increasing scarcity of the raw material. The medicinal repute of the plant seems to be ancient, since the name *Eryngium*, of which the Greek equivalent is employed by Dioscorides, refers to its value in flatulence and as an antispasmodic. The candied root-stocks, elaborately flavoured and perfumed, as is fully described in Gerard's "Herball," were not only esteemed as "an excellent sweetmeat," but as a remedy for colds and coughs, and they were, no doubt, a very good and harmless demulcent. We read of presents being made of this candy from the borough of Colchester to the Bishop of London, to Queen Charlotte, and to George III.

The aerial stems are often prostrate, but may rise a foot or two from the ground, forking trichotomously: the radical leaves are stalked and suborbicular in outline,



THE SEA HOLLY—continued.

trilobed with cartilaginous wavy and spinous margins, reaching from two to five inches in diameter ; while the cauline ones are amplexicaul, or have a basal sheath ; and three, reduced in size and sessile, form the involucre. Obviously this chevaux-de-frise of spinous points, turning in all directions, is an effective protection against any browsing animal.

The almost sessile flowers are individually only about an eighth of an inch in diameter. Between the bases of their petals and stamens is a ten-pointed honey-secreting disk, and this is arched over and protected from rain and the more minute insects by the incurved tips of the petals and the filaments of the stamens. The tips of the obovate petals are folded in to a distance nearly half the length of the petal. This protection can, however, be readily pushed to one side by the proboscis of one of the larger insects. The flowers are protandrous, and it requires a proboscis four millimetres in length to reach the honey, so that pollination is probably mainly effected by the smaller bees and wasps as it has been found to be in the case of the allied *E. campestre* Linné. Possibly the thickly imbricate, chaffy scales that cover the ovary and persist in the fruit stage may be some protection against honey-thieves.

The inland species, *E. campestre* Linné, is much less glaucous ; in fact, it may generally be termed pale green. It is a more slender, more erect, more branched, and less succulent plant, and is exceptional in having its leaves pinnately divided. The flowers are white or pale blue. It occurs in waste-places and by road-sides throughout most of Europe ; but not in northern Russia, Scandinavia, Denmark, Scotland, or Ireland. It is fairly abundant in northern France, where it is known as *Chardon Roland* ; and we have noticed the graceful outline of its foliage introduced into the Renaissance stonework of Norman churches in the immediate neighbourhood of which the plant was still growing. There is nothing, therefore, inherently improbable in the species being truly wild in England, though it is of rare occurrence. It is sufficiently striking to attract attention ; but it is, perhaps, only in Northamptonshire that it has done so sufficiently to acquire popular names. There it has been known as *Watling-street Thistle*, as *Hundred-headed Thistle*, and as *Daneweed*. It was, however, at Plymouth that it was first recorded as a British plant, Ray noticing it there in 1662 ; and it was still growing in the same station in 1880.

Several beautiful exotic species are cultivated in our gardens, such as *E. alpinum* Linné, *E. amethystinum* Linné (a native of Dalmatia), *E. Bourgati* Gouan (the *Chardon bleu* of the Pyrenees), *E. planum* Linné (from Central Europe), *E. corniculatum* Linné (from the Iberian peninsula), and *E. pandanifolium* Chamisso and Schlechtendal (a gigantic species from Uruguay). All of these thrive in a light, well-drained, sandy loam.

CLXXXVIII.—THE WOOD SANICLE.

Sanicula europæa Linné.

IN general textbooks of plant-anatomy the umbel is treated as an indefinite, racemose, or centripetal inflorescence ; but in the Family *Umbelliferae* it is not infrequently cymose, wholly or in part. This is the case in *Hydrocotyle*, *Eryngium*, and *Sanicula*, as can generally be seen from the centrifugal order in which the flowers open.

The genus *Sanicula* comprises about a dozen species of slender, erect, perennial herbs, natives of the North Temperate Zone. They have short, stout, creeping rhizomes ; palmately-lobed leaves ; small sub-globose umbellules in irregular umbels with leafy bracts ; and an ovoid fruit covered with hooked spines. The sepals are leaf-like and as long as the petals, and the petals have a long incurved point, so that they appear deeply notched. The fruit is nearly circular in transverse section, exhibiting hardly a trace of ridges, but with numerous oil-vittæ : the styles are slender and long ; and the seeds are flat on their commissural surface.

Among the *Umbelliferae* it is often difficult to be sure as to the presence of both stamens and carpels owing to the extremely protandrous character of the flowers in most genera. There is thus usually a first or staminate stage in which the anthers may develop, mature, and discharge their pollen before the styles are visible, so that the stage may be mistaken for a purely staminate flower ; and, later on, the anthers and even the filaments of the stamens may fall off when the flower passes into its second or carpellate stage, so that it in turn may be taken for an exclusively female flower. Thus perfect flowers may be readily mistaken for imperfect ones, and an inflorescence made up entirely of perfect flowers be described as polygamous. In the case of our Wood Sanicle (*Sanicula europæa* Linné), the only European species of the genus, it would seem, unless several observers are in error, that the plant presents different arrangements of the essential organs in different localities.

The Wood Sanicle, though often overlooked because growing in dense shade, is by no means an unattractive plant. Its leaves are particularly beautiful. They are mostly radical, long-stalked, sub-orbicular, and glossy, from one to three inches across, palmately three to five lobed, the lobes being wedge-shaped, three-lobed, and unequally serrate. The almost leafless peduncles are generally about a foot high and branch dichasially, with from two to five unequal and generally pinnatifid leafy bracts for the involucre. The flowers are white, or very frequently tinged with pink ; and, according to most authorities, the outer flowers in each head or umbellule are staminate and slightly stalked, whilst the centre and earlier-formed flowers are sub-sessile and perfect, though decidedly protandrous. Hermann Müller and Baron Kerner von Marilaun describe some ten to twenty outer staminate flowers to one to three perfect ones in the centre ; but while Müller describes these central flowers as



THE WOOD SANICLE—continued.

protandrous, Kerner speaks of them as protogynous, and another observer has described them as male.

The plant is very tolerant of shade and is by no means particular as to soil. It occurs in woods on clay or sand, and under Beech-trees on chalk it often constitutes the dominant feature of the ground-vegetation. In these almost sunless situations the flowers are chiefly visited by small flies and beetles; but, crowded together as they are, it is quite possible for the long styles of one flower to bring their stigmas into contact with the anthers of another flower. These prominent reflexed styles persist into the fruit stage, when the recurved hooks on the fruit form a bur which is obviously adapted to the transport of the fruit by passing animals.

The name *Sanicula* seems to have been first used by Brunfels and is usually explained as derived directly from the Latin *sanare*, to heal. Dr. Prior, however, follows Adelung's "Wörterbuch" (1775) in insisting that this is contrary to the principles of etymology and in suggesting that it is an open question whether the name be of Latin or of German origin.

"The great abundance of the plant in the middle and north of Europe would incline us rather," he writes, "to the latter as the likeliest, and it may be a corruption of *Saint Nicholas*, called in German *Nickel* . . . *Sanicula* does not occur in classical Latin writers, and there is no such word as *sanis* or *sanicus* from which it could have been formed. But in favour of the derivation from *San Nicola* or *Sanct Nickel* is . . . the legend of his having interceded with God in favour of two children, whom an innkeeper had murdered and pickled in a pork tub, and obtained their restoration to life and health . . . A plant named after this saint, and dedicated to him, might very reasonably be expected to 'make whole and sound all wounds and hurts both inward and outward,' as Lyte and other herbalists tell us of the sanicle. The Latin name, as in so many other cases, would be the nearest approach that could be made to the German."

The modern German name of the plant appears as *Sanickel*, the French being the same as the English. Whatever the derivation, however, the name was, as Dr. Prior points out, generally understood in mediæval times as meaning "curative," and suggested many proverbial sayings, such as the French

"Qui a la bugle et la sanicle
Fait aux chirurgions la nicle."

"He who has bugle and sanicle makes a joke of the surgeons."

CLXXXIX.—THE SLENDER HARE'S-EAR.

Bupleurum tenuissimum Linné.

THE large Tribe *Ammineæ*, to which our next five types belong, is characterised by having compound umbels, laterally compressed fruit with a consequently narrow commissure, with only the primary ridges conspicuous, and generally with obvious vittæ. Besides the genera here represented, it includes *Conium* (the Hemlock), *Smyrniium* (Alexanders), *Apium* (Celery), *Petroselinum* (Parsley), *Carum* (Caraway), and *Ægopodium* (Gout-weed).

As these names suggest, the *Umbelliferae* include plants with somewhat varied properties. From this point of view they can be conveniently arranged in four groups. First, there are those whose stems contain an abundance of a fetid gum-resin. This group can hardly be said to be represented among British plants, its chief genus being *Ferula*, the source of Asafœtida (Gum Galbanum), which belongs mainly to the dry regions of Central Asia. Secondly, there are those that abound in an acrid, watery sap, more or less narcotic and poisonous, including several British genera, such as the Hemlock, Water Hemlock, Water Dropworts (*Ænanthe*), and Fool's Parsley (*Æthusa*). Thirdly, there are plants with fruits rich in wholesome aromatic oils, such as Coriander, Dill, Anise, Cumin, and Caraway; and fourthly, there are those *Umbelliferae* which contain some of these various principles in so slight a degree that they form wholesome esculents. Such are Carrots, Parsnips, Parsley, Fennel, Chervil, Samphire, Eryngo, and Angelica. Celery, too acrid to be used as food when green but wholesome when blanched by being earthed up or covered from the light, occupies an intermediate position. As will be seen from the list of genera in the Tribe *Ammineæ* given above, this grouping by properties has little connection with the subdivision of the Family in accordance with structural characters.

The genus *Bupleurum* comprises some ninety northern species, erect, glabrous plants with yellow flowers, their most striking character being the reduction of their leaves to simple, undivided, and entire sheaths, a character practically unique in the Family. These phyllodinous leaves are sometimes strongly ribbed longitudinally, a character which is said to be the origin of the name *Bupleurum*, which dates from Hippocrates, the "Father of Medicine" (459–361 B.C.), and is derived from βούς, *bous*, an ox, πλευρόν, *pleuron*, a rib. Their thickened cuticle, few stomata equally distributed on both surfaces, general rigidity, and vertical position adapt the plants to the dry conditions under which they mostly live. They include both annuals and perennials: there is no free limb to the calyx: the petals are strongly inflexed at the tip; and the carpophore between the two oblong pentagonal carpels bifurcates.

None of our four British species of the genus can be called common. The most frequent is, perhaps, *B. rotundifolium* Linné, an annual, occurring as a cornfield weed on calcareous soil. It has a freely-branching stem; ovate, acute, perfoliate, glaucous



THE SLENDER HARE'S-EAR—continued.

leaves ; and greenish-yellow bracteoles three times as long as the minute yellow flowers of its umbellules. Turner writes of it in his "Names of Herbes" (1548):—

"Perfoliata is an herbe wyth a leafe lyke a pease, & litle blacke seedes in the top. The Germans cal it Durchwassz. It maye be called in englishe Thorowwax, because the stalke waxeth thorowe the leaues."

The name *Hare's-ear*, or rather its Latin equivalent *Auricula leporis*, given by the early herbalists to an allied continental species, has now been adopted as a general English name for the group, and appears also in the German *Hasenöhrrchen* and the French *Oreille de lièvre*, though in the latter language *Buplèvre* is also used. It is possible that the species to which this name originally referred, stated by Lobel to occur about Montpellier, was *B. falcatum* Linné, a perennial, one to four feet high, with sickle-shaped cauline leaves, which was first definitely recorded in England in 1833, by Thomas Corder, who found it two years previously in the hedgerows between Chelmsford and Ongar, Essex, where it still grows.

The narrow-leaved annual *B. aristatum* Bartling, which has pointed bracteoles longer than its flowers, is also very rare, having been only recorded in England from Devonshire and Sussex.

The species here figured, *B. tenuissimum* Linné, is more frequent, though, as it is a slender annual, easily liable to be choked by other vegetation, its occurrence is apt to be somewhat fortuitous. It is a salt-marsh plant, but occasionally occurs in sandy and gravelly waste-places inland. Having, as Syme says, a habit somewhat between that of Knot-grass (*Polygonum aviculare* Linné) and Toad Rush (*Juncus bufonius* Linné), it is, no doubt, often overlooked. The slender, wiry, flexuous stems may reach a foot in height, and, unlike those of most of the Family, are solid. The linear-lanceolate leaves are about an inch long and rigid, and have three longitudinal veins ; and the subulate bracts and bracteoles are unequal in length but generally longer than the little umbels which consist of about three minute yellowish flowers. The stamens mature somewhat before the stigmas, in August or September ; but the flowers do not appear likely to attract many insect visits.

CXC.—THE STONE-PARSLEY.

Sison Amomum Linné.

IT is not difficult to correlate the main structural features of the majority of the *Umbelliferae* with their physiological characters or mode of life. Most of them are herbaceous perennials with relatively somewhat small and slow-growing underground parts. In other words, most of the food manufactured by the radical leaves is rapidly transferred to the tall and quick-growing aerial stems, so that there is not much surplus, as it were, to add to the underground growth. The rapidly formed stems are of a diameter proportioned to their height, branching and weight of leaves, flowers and fruit. Their fluted exterior is but the result of the peripheral arrangement of the groups or bundles of large water-conducting vessels which give them just sufficient mechanical strength to support the vertical strain or weight: the cylindrical form offers sufficient resistance for their height to horizontal stress; while the rapidly dying pith and subsequently hollow condition is indicative of the great economy of material. It is quite as possible to connect size of stem with area of nourishing leaves in such herbaceous plants as these, as Ruskin, in his "Modern Painters," pointed out that it was in the case of trees; but it has to be remembered that, though the little cauline leaves no doubt serve to nourish the stem in their immediate neighbourhood, the bulk of the formative material required by the stem and its branches, the flower-clusters and the fruits, must certainly come from the physiological activity of the lower leaves, whether during the present or during a preceding season, by way of the rhizome.

The first striking characteristic of the group to manifest itself in spring is the fern-like division of the leaf into a bipinnate or tripinnate arrangement of innumerable small toothed and pointed leaflets. Wide apart as are the two groups, this has, no doubt, the same physiological significance in the *Umbelliferae* as in Ferns. The leaves are often of a delicate texture, wilting rapidly when picked. The fine division of their surface—none of the segments overlapping—adds enormously to their length of margin and general area, with an economy of cellular tissue, while it is accompanied by a great subdivision of the vascular system, veins extending into every minutest segment, so that transpiration is, as a rule, rapid. Rapid transpiration in a growing plant is as much the expression of rapid internal chemical change and growth as active respiration in a moving animal is the expression of violent muscular exertion.

At the same time, the success of the *Umbelliferae* in the struggle for existence is manifest in the many genera and species into which the type has varied; the numerous individuals of single species, often growing in a social condition and dominating other herbaceous vegetation; and also in the adaptation of members of the Family to very varied surroundings. They may grow in water or mud, like the Water Dropworts (*Enanthe*); be deeply-rooted in sandy steppes, as are the



THE STONE-PARSLEY—continued.

species of *Ferula*, the Giant Fennels ; cling to the crevices of spray-washed rocks, like the Samphire ; or spring up rapidly in dry pastures, as does the Common Burnet Saxifrage (*Pimpinella Saxifraga* Linné).

The massing of the innumerable florets into a flat-topped umbel, the frequent “radiant” enlargement of the outermost petals, and the simultaneous staminate or stigmatic condition of the flowers of an umbel, with their freely exposed honey, are adaptations, to secure, at least occasionally, cross-pollination by insect agency, as obvious as the adaptations of the vegetative structure. Finally, the thin pericarp shows a further economy of material : it is so light as to be often transported by wind, for which purpose too it is often winged, while its two mericarps generally separate to give each seed an independent chance of germination.

The Stone-Parsley (*Sison Amomum* Linné) belongs to a genus, nearly related to the Parsleys (*Petroselinum*) and Caraways (*Carum*), which only contains one or two species, and exhibits the typical characters of the Family with no extreme modification. It grows as a biennial, in damp places on calcareous soil, chiefly in the south of England, its distribution beyond our island being distinctly West European. It is doubtful how far either of its scientific names originally belong to it, *Sison*—used for it and other plants by Dioscorides—being said to be derived from a Celtic word signifying a running brook, and *Amomum* being applied by Pliny to some plant which certainly was not this species. The latter name, now used generically for a group of plants, related to the Gingers, which bear the aromatic fruits known as Cardamoms, may have reference to the little globular Coriander-like fruits of this plant, which, when ripe, are pungent and aromatic. The whole plant, when green, has a peculiarly nauseous smell, especially if bruised ; but these ripe fruits were formerly used medicinally, especially in the treatment of a hard swelling in the cheek known as a “hone.” Perhaps, however, the true remedy was the allied and similar *Petroselinum segetum* Koch, which is known in books as *Corn Honewort*, *Sison* being called *Hedge Honewort*.

The most distinctive features of *Sison* are its slender, rigid, divergent branches ; its simply pinnate lower leaves of five to nine leaflets ; its compound umbels with few primary rays of irregular length, and from two to four thread-like bracts and as many bracteoles ; the minute blossoms with deeply bilobed cream-coloured petals ; and the ribbed globular fruit with short club-shaped oil-vittæ, solitary in each furrow.

As for *Stone-Parsley*, Lyte’s name for the plant would seem to be an inappropriate pleonasm, since *Parsley* is merely *πετροσέλινον*, *petroselinon*, a rock umbellifer, and *Sison* is not a rock-plant.

CXCI.—THE SWEET CICELY.

Myrrhis Odorata Scopoli.

IN spite of the delicate division of their leaves, which are often of a cheerful shade of green and form an attractive background to the wealth of white disks of blossom, the *Umbelliferae* cannot be termed a popular group of plants. Their individual flowers are small: they do not display any variety of gay hues; and they are very generally included under the indiscriminate condemnation of

“the hemlock rank
Growing on the weedy bank.”

As we have previously remarked, however, the number of popular names borne by a species is a good criterion as to its degree of general recognition and appreciation, though this may be based on utilitarian rather than æsthetic considerations. Tried by this standard, Sweet Cicely is apparently one of the most appreciated species in the Family.

Vegetable perfumes are among the most ancient uses of plants, and it would seem that from an early period cheaper home-grown substitutes were found for the costly articles of foreign commerce. At all events, there is no question as to the etymological connection in ancient Græce between *μύρρα*, *murrha*, myrrh, the fragrant resinous exudation of various species of the genus *Commiphora* or *Balsamodendron*, mostly natives of Somaliland; *μύρτος*, *murtos*, the myrtle, a fragrant-leaved shrub native to Western Asia, though naturalised at an early period in Europe; and *μύρρις*, *murrhis*, the name employed by Dioscorides apparently for the plant of which we are now writing. Though very different in habit, and almost in every detail of structure, so that they belong to three distinct Families, these three plants are all fragrant. The last of the three was, in fact, designated by Rivinus in 1699 by the generic name *Odorata*, so that, when described by Scopoli in his “Flora Carniolica” in 1772 under the genus *Myrrhis*, the specific name *Odorata* was retained with an initial capital, because it had been previously generic. At the same time, Scopoli’s name takes precedence of that given by Rivinus, or of the *Cerfolium* used by Gerard, as being post-Linnæan, and of Linné’s own *Scandix odorata*, because this plant is well entitled to be ranked in a genus distinct from that which includes Venus’s Comb.

Although to most people the name *Cicely* probably suggests a familiar abbreviation of the female name Cecilia, it is in point of fact merely a phonetic spelling of the pure Greek name *σέσελι*, *seseli*, used by Dioscorides for various *Umbelliferae*, and appropriated by Linné to an allied genus. There is so much aromatic fragrance about the whole plant that such names as *Sweets* and *Sweet Humlock* are easily understood. As the plant is not wild in southern England or Ireland and doubtfully so in the Lowlands of Scotland, it is only natural that almost all its popular names belong to the mountainous counties of northern England, where



THE SWEET CICELY—continued.

there is no reason to doubt its indigenous character. Such names as *Sweet Bracken* and *Sweet Fern*, considering the finely divided leaves, which do undoubtedly resemble the fronds of some ferns, cannot surprise us when we constantly hear people speak of Meadow-rue and Asparagus as ferns ; while the name *Roman Plant*, recorded by Messrs. Britten and Holland from Milnthorpe, Westmorland, suggests that in that neighbourhood the plant was not looked upon as indigenous, though it might only mean that as belonging to the hills it was unfamiliar to lowland folk. That our earlier botanical writers did not treat this species as truly wild resulted merely from the slight extent to which the hills of the north were explored until the eighteenth and nineteenth centuries.

The large fleshy root is sweet and aromatic like the rest of the plant : the leaves are still used in salads in Italy ; and the plant was originally known in southern England only as a pot-herb. Like the other aromatic plants of this Family—Coriander, Anise, Dill, Cumin, and Caraway—it has some real value as a mild stimulant and stomachic. Among more curious uses to which it has been applied are the smearing of the insides of hives with the fruits in order to attract bees, and the polishing of oak furniture.

Apart although, however, from such utilitarian suggestions, Sweet Cicely is well worthy of cultivation near shrubberies or in the wilder parts of the garden for its various graces of form and fragrance. The stem is furrowed and hollow and grows to a height of two or three feet ; and both it and the leaves are slightly downy with soft hairs. The tripinnate leaves are large, with sheathing bases and a whitish under surface, and are of a pleasingly bright shade of green ; while the light open compound umbels of small white flowers borne aloft above the foliage are graceful in themselves and are succeeded by large glossy fruits that turn from green to a dark brown. There is, as a rule, no involucre at the base of the main or primary umbel ; but whitish, ciliate, membranous bracteoles below the umbellules. Only the outer flowers are perfect and in them the stamens mature before the stigmas, all the flowers in an umbel being simultaneously staminate. The later-formed, inner flowers are staminate. The calyx is inconspicuous and the petals are obcordate with an inflexed point. The fruits reach an inch in length and are at first surmounted by two slender divergent styles. Its carpels separate from a Y-shaped carpophore and have five very prominent equal primary ridges which are hollow and often rough externally.

The flowers, which appear in May and June, are fragrant ; and, as is generally the case, the aromatic properties of the plant occur in their most concentrated form in the seeds.

The plant can be readily propagated either by division in early autumn or spring, or by seeds sown out of doors as soon as they are ripe, the seedling plants being afterwards pricked out in the spring.

CXCII.—THE WILD CHERVIL.

Chærophyllum sylvestre Linné.

THOSE who make no pretence to botanical knowledge are familiar with many umbelliferous plants in field and hedgerow, orchard, and waste-places. They notice merely the much-cut fern-like leaves with sheathing base and the broad flat round clusters of small white blossoms borne aloft horizontally on numerous stalks radiating from a common point like the supports of an umbrella. The familiarity of this sight causes them to overlook its beauty: the Hemlocks or Wild Parsley are but common weeds. In winter, perhaps, it is noticed that the stems of the annual shoots remain as brittle hollow tubes, inside which strips of dead pith may be seen; and in many parts of the country these hollow stems are known as *Kecks*, *Kecksies*, *Kaxes*, or some similar name. In former times, when hand-loomes were common, these Kecks were used as winders for yarn; but it is not clear whether the term was first applied to the hollow stem of the handy weed or to the winder used by the craftsman, whatever its material might be. There was undoubtedly no discrimination as to the use of any particular species, or as to the application of the name to one more than to another.

Fatal accidents long ago familiarised the countryman with the fact that some Hemlocks are certainly very poisonous. Fortunately most of these wild species are sufficiently unlike the Parsnips, Carrots, and Parsley of our gardens for no mistake to arise; but they cannot be readily discriminated, and are, therefore, lumped together as dangerous weeds, at least for human beings, though many of the lower animals may eat some of them with avidity.

The botanical tyro shares this popular dislike of the *Umbelliferae* because of the difficulty in distinguishing between the species, especially during the flowering season, when most outdoor study is practised. The main generic characters are, in fact, in their fruits; and, even when these are examined in autumn, it must be admitted that the characters are by no means always easy to see with the naked eye or the pocket-lens, or to explain in the few words of a Flora. Their great length at once distinguishes the fruit of *Scandix*, as at present limited and among British species; and the stiff bristles on their fruits, which give them the name of Bur-Parsley, separate off the genera *Caucalis* and *Torilis*; but no such marked characters serve to separate Linné's genus *Chærophyllum* from George Francis Hoffmann's *Anthriscus*; so that, even since that careful botanist published his "Plantarum Umbelliferarum Genera" at Moscow in 1816, there have been considerable fluctuations in nomenclature. One source of this confusion was the fact that Curt Sprengel was at work on the group at the same period, his "Plantarum Umbelliferarum Prodrromus" being published at Halle three years before Hoffmann's work, and his "Species Umbelliferarum" in 1818.

We prefer, therefore, to follow in this matter Babington's "Manual" and Messrs. Britten and Rendle's "List," rather than Hooker's "Student's Flora," and



THE WILD CHERVIL—continued.

to treat *Anthriscus*, therefore, merely as a sub-genus of *Chærophyllum*. The latter genus may then be described as more or less hairy plants, annual or perennial, with much divided leaves ; compound, many-rayed umbels, with few or no bracts at the base of the main umbel, but several bracteoles below the secondary umbels ; with flowers usually white, but sometimes yellow ; inconspicuous sepals ; obcordate petals with inflexed tips ; and fruits compressed laterally, very shortly beaked, with five equal blunt primary ridges, not prominent and often only discernible on the beak, and either without vittæ or with one between each pair of ridges.

Of the four species which occur in Britain, one, *Chærophyllum sativum* Lamarck, or *Anthriscus Cerefolium* Hoffmann, is the Garden Chervil, long used as a salad plant and probably only an escape from cultivation. This is, perhaps, the plant to which Dioscorides's name *Chærophyllum* or rather *χαίρέφυλλον*, *chairephullon*, originally applied. It is derived apparently from *χαίρω*, *chairō*, I rejoice, and *φύλλον*, *phullon*, a leaf ; and Gerard, translating Dodoens, explains that

“It is thought to be called so because it delighteth to grow with many leaves ; or rather in that it causeth joy and gladness.”

The Greek *Chairephullon*, which Linnæus chose to transliterate as *Chærophyllum*, had long before been rendered into Latin as *Cerefolium*.

Chærophyllum sylvestre Linné, the *Anthriscus sylvestris* of Hoffmann, is one of our commonest weeds in meadows, orchards, and hedgerows. With an erect furrowed stem, reaching three feet in height, hairy below but smooth in its upper parts, branched, leafy, and hollow, with slight swellings below each node, it has bipinnate leaves with pinnatifid serrate leaflets and terminal, stalked umbels which droop in the bud stage. The outer florets of the umbel are asymmetric in their corollas, the petals nearer to the circumference of the umbel being larger than the others, thus adding to the conspicuousness of the inflorescence as a whole. The flowers are markedly protandrous, being all in a male or staminate condition in an umbel and shedding their stamens before the stigmas become receptive. The central flowers of the umbel are often exclusively staminate. The honey is exposed in the centre of the flower and is collected by numerous insects.

While the petals are white, the bracteoles, which are usually about five in number, are often tinged with pink ; and the plant is generally noticeable as the earliest of its kind to blossom, being often out in April. The fruits are smooth, shining, and narrower at their upper ends.

Eaten eagerly by many animals, the plant is known as *Rabbit-meat*, *Coney-Parsley*, *Hare Parsley*, *Ass Parsley*, *Dog's*, *Pig's*, or *Sheep's Parsley*, *Cow Parsley*, or *Cow-weed* ; and also by a series of names indicating that it is not fit for human food, such as *Devil's Parsley*, *Devil's Oatmeal*, and *Naughty Man's Oatmeal*, these last two names being supposed to refer partly to the little meal-like flowers.

CXCIII.—SHEPHERD'S NEEDLE.

Scandix Pecten-Veneris Linné.

OUR ancestors, who lived in the country and passed most of their lives in the open air, were by no means lacking in perception. Not having technical botanical training, they might fail to discriminate between many nearly allied forms of plants that are wellnigh identical in their chief external features ; but, where a plant possessed any marked peculiarities of form, they were not slow to notice them, though it might not be a very large or conspicuous species.

Thus *Scandix Pecten-Veneris* Linné, a small cornfield weed, has more than thirty popular names, more or less current and found in use in all parts of the country where the plant occurs, *i.e.* wherever there are cornfields. Few of these names are shared with other species—a proof that its distinctive peculiarity, unlike those of many nearly related *Umbelliferae*, was widely recognised. This is the more remarkable in that we do not know of the plant having been applied to any useful purpose. It was merely a well-known weed. It is true that *σκάνδιξ*, *skandix*, is used by Theophrastus and Aristophanes for some edible plant, apparently a kind of Chervil ; but it is not at all clear that this was the species to which we now apply the name. It is remarkable that in three fifteenth-century vocabularies, printed by Professor Earle, *Scandix* is explained as Madder ; whilst Turner, in 1548, writing apparently of the Shepherd's Needle, ignores all its popular names—some of which must almost certainly have been in use long before that period—and proposes an English name of his own invention.

“Scandix,” he says, “groweth in Germany among the corne. The greatest plentie of it that euer I sawe, was betwene Bon and Popelsdorp in a corne felde. It may be called in english corne Cheruel. It is hote & dry in the thirde degree.”

Sir James Edward Smith writes that the plant

“is sometimes a troublesome weed, to which, though slightly aromatic and acrid, no particular use is attributed.”

The mere occurrence, however, of the name of the plant in Turner's “Names of Herbes” is, perhaps, proof that it had at some time been considered medicinal.

The genus *Scandix* comprises about a dozen annual species, natives of the Temperate regions of the Old World. They have pinnately decompound leaves, divided up into minute segments ; and simple or compound umbels of white flowers, without bracts, but with several bracteoles which are generally cut or fringed and considerably longer than the very short flower-stalks. The calyx-teeth are more or less completely suppressed and the little spreading petals are generally unequal, the outermost one in the flowers at the margin of the umbels being often relatively quite large. There is a red-tinged, five-lobed disk, and the central flowers of the umbel or those forming little umbels “of the third order”—borne, that is, on pedicels rising among the flowers of the secondary umbels—may be entirely staminate. Stamens and stigmas may mature simultaneously, or the former may be



SHEPHERD'S NEEDLE—continued.

somewhat the earlier. The most striking feature, however, in all the species is the relatively enormous elongation of the inferior ovary, and especially of its "beak," after fertilisation, the latter being five or more times as long as the ovary itself. The fruit is sub-cylindric and rough with bristles : each of its carpels has five blunt primary ridges : the oil-vittæ are hardly discernible ; and the seeds are deeply furrowed on the side nearest the commissure.

Our British species *Scandix Pecten-Veneris* Linné, which may well, as Hewett Watson thought it, be a colonist, introduced originally with seed corn, is a small plant, seldom exceeding a foot in height and branching freely from the tap-root. The whole plant is slightly downy with spreading hairs, but its leaves are a bright green. Its umbels are both terminal and lateral, so that they often appear in pairs ; but the ultimate umbels bear comparatively few flowers. It is very remarkable that the involucre before the pollination of the flowers has its leaves undivided, but immediately one flower is pollinated these leaves enlarge considerably and become notched. After fertilisation also the whole ovary of each flower enlarges, its upper portion or "beak" elongating rapidly to two or three inches, often carrying up with it the yet unwithered petals. When ripe the two halves of the fruit split apart with a violent jerk.

It is not surprising that early botanical writers should have recognised the striking resemblance of this plant, with its pinnate leaves and beaked fruits, to the Stork's-bill (*Erodium*), from which, however, it differs fundamentally in the beak being produced below, not within, the flower.

Matthioli called the plant *Pecten-Veneris*, and Gerard, translating the name as *Venus's Comb*, speaks of its

"long seedes, very like unto pack-needles, orderlie set one by another like the great teeth of a combe."

Though the names *Shepherd's Bodkin* and *Deil's Elshin*, i.e. Devil's Awl, do occur, the great majority of the plant's appellations contain the word *Needle*, country taste differing as to whether the needle belongs to Adam, Venus, Puck, Our Lady, the Devil, a Shepherd, a Tailor, an Old Woman, a Beggar, or a Crow. The name *Stikpile*, also applied to *Erodium*, is probably very ancient ; and *Clock-needle*, current in the south of Buckinghamshire, may be *keck-lock*, or *leac*, *needle*, i.e. the needle plant with a hollow stem, from the Old English *leac*, a plant. *Shepherd's Needle* is represented in the French *Aiguille du berger* ; but it may be doubted whether the names *Venus's Comb* or *Lady's Comb* have much *bonâ fide* currency as folk-names. Unlike many of Gerard's happy coinages, they have failed to catch the public fancy, in spite of the fact that the former is a literal translation of the specific name universally adopted by botanists from the time of Linnæus.

CXCIV.—THE COMMON FENNEL.

Fœniculum vulgare Miller.

THE Tribe *Seselineæ*, agreeing with the *Ammineæ* in having compound umbels and only the primary ridges on their fruits, are specially characterised by having their fruits short, either cylindrical or compressed antero-posteriorly, so that the commissure is their widest portion, and with no lateral wings, and their seeds flat on their ventral sides. It includes the genera *Seseli*, *Fœniculum*, *Crithmum*, *Ænanthe*, *Æthusa*, and *Angelica*, and two or three others with British representatives.

The genus *Fœniculum* comprises three or four species of tall, glabrous, biennial or perennial herbs, mostly natives of the Warmer Temperate Zone of the Old World, although our common species is apparently truly wild on our southern coasts and as far north as Norfolk and North Wales, and, perhaps, in Ireland. They have pinnately decomposed leaves with slender, often capillary, segments, and umbels of yellow flowers with neither bracts nor bracteoles. The calyx-teeth are also practically absent : the petals are entire and roundish, with a short, broad, blunt, inflexed tip : there is a conical disk : the styles are short ; and the fruit oblong, sub-cylindric, with ten prominent bluntly keeled ridges, with an oil-vitta between each pair, and a bifurcate carpophore.

Our species, *F. vulgare* Miller, occurs from India and North Africa to our shores, where, though often found in waste-places as an escape from cultivation, it grows in a more unequivocally wild state on rocks and sea-cliffs, especially if calcareous. It is a perennial and reaches three or four feet in height, its branched, tapering, striate, and polished stems being filled with pith. The leaves have short stalks and capillary segments, with a groove along their upper surfaces ; but the cultivated plant, with stouter, more awl-shaped segments, is probably the same species. The umbels have numerous rays which are glaucous, and the outer rays are somewhat longer, giving the whole umbel a slightly concave surface.

The whole plant is aromatic, its properties being most concentrated in the seed, and there is no doubt that it shares the carminative and stomachic value of Dill, Anise, and Coriander. It is recommended medicinally in the Papyrus Ebers which belongs to about the year 1550 B.C. The name *Fœniculum* occurs in Pliny, who tells us that serpents sought the shade of this plant to strengthen their sight ; and, whether this was the origin of the belief or not, fennel water was long prescribed as an eye-wash. A rhyming Latin prescription runs

“Fœniculum, Rosa, Verbena, Chelidonia, Ruta,
Ex his fit aqua quæ lumina reddit acuta,”

which has been freely translated,

“Of Fennel, Roses, Vervain, Rue and Celandine
Is made a water good to clear the sight of eyne.”



THE COMMON FENNEL—continued.

The versified fourteenth-century manuscript herbal, preserved at Stockholm and ascribed to John of Milan, which we have already quoted with reference to Fumitory, has much to say in praise of Fennel, beginning

“Fenel is herbe precyows—
Good is his seed, so is his rote.”

The old beliefs in its virtues have been pleasantly enumerated by Longfellow in a poem of which the following are the two more important stanzas.

“Above the lowly plants it towers,
The fennel with its yellow flowers;
And in an earlier age than ours
Was gifted with the wondrous powers—
Lost vision to restore.

“It gave men strength and fearless mood,
And gladiators fierce and rude
Mingled it with their daily food;
And he who battled and subdued
A wreath of fennel wore.”

Fennel is certainly a plant of classic renown, if for no other reason than that the plain of Marathon derived its name from the abundance of this plant, *μάραθον*, *marathon*, being the Greek for Fennel. It was used in mediæval times, with St. John's-wort, in the midsummer rejoicings, put over the doors, strewn around the bed, or placed for purposes of divination under the pillow. As an old couplet has it :—

“Mirie it is in time of June
When finil hangeth in town.”

In cookery, Fennel has long been associated with fish and fasting. In “Piers the Plowman” we read of the necessity of

“A ferthyng-e-worth of fenel-seed
For fastyng-e days”;

and Culpeper, full three centuries later, explains that it

“consumes that phlegmatic humour which fish most plenteously afford and annoy the body with, benefitting this way because it is a herb of Mercury under Virgo and therefore bears antipathy to Pisces.”

Even the use of Fennel as a garnish and sauce for cod or other fish seems to be going out of fashion; and, save for the alleged importation of considerable quantities of the seed as a flavouring for gin, the plant may be said to have ceased to be put to any utilitarian purpose. It is, however, by no means unornamental: it will grow in any ordinary garden soil, preferring, perhaps, a sunny situation, and can be readily propagated either by division in autumn or by seed sown in spring.

The name is almost certainly a diminutive from *fænum*, hay, whether merely from a suggested comparison of the smell of the plant with that of new-mown hay or from its use, like fenugreek and dill, to improve the smell of musty or inferior hay. From its original form the name has not departed very widely. We have a Mediæval Latin *Fanculum*. Turner, in his “Libellus de re herbaria” (1538), spells it *Fænell* and *Fyncl*. In his “Names of Herbes,” ten years later, he writes :—

“Feniculum is called in greke Marathon, in english Fenel or fenkel, in duch Fenchel, in french Fenoul.”

Ray gives the alternative spelling *Finckle*, and the modern French is written *Fenouil*.

CXCV.—THE SAMPHIRE.

Crithmum maritimum Linné.

THREE British plants are known as Samphire. *Salicornia*, the erect, much-branched fleshy Marsh Samphire of our saltings, with minute flowers, a plant preferred on some coasts as a pickle to the true Samphire, we have already described. *Inula crithmoides* Linné, the rarer Golden Samphire of our southern and western coasts, grows both on marshes and on rocks, and derives its specific name *crithmoides* from the likeness of its fleshy foliage to *Crithmum*; but is at once distinguished, when in flower, by its solitary golden capitula, which are about an inch across. Its name has been translated as the Samphire-leaved Flea-bane. The true or Rock Samphire (*Crithmum maritimum* Linné), however, was the first to obtain the name, which, no doubt, referred in the first instance to the stations in which it grows. The name *Petrus crescentius*, which it is said to have borne, the old French *Perce-pierre*, and the rarely found English name *Pierce-stone*, all suggest that, as in the word Saxifrage, it was assumed that a plant which springs from crevices in rocks has itself forced apart the rocks. Lyte in using the name *Crestmarine* wished apparently to preserve the notion of Sea Cress; but at an early date the rock-loving plant became dedicated to the saint whose name signifies a rock, and it was the *Herba di San Pietro* and the *Herbe de S. Pierre* and apparently the *Saint Pierre* of the French. Turner spells the English name *Sampere*, Lyte and Gerard have *Sampier*, Ray, Petiver, and Smith give it as *Sampire*, as also do the folios and early quartos of Shakespeare; but the spelling *Samphire* of the later received text of the poet has fixed the modern form of the word.

There is but one species in the genus *Crithmum*, the name of which, in its Greek form, *κρίθμον*, *krithmon*, which occurs in Dioscorides, is supposed to be derived from *κριθή*, *krithe*, barley, from the resemblance of the fruit of the Samphire to a barleycorn. The chief generic characters of the plant are the compound umbel with many rays and many short bracts and bracteoles; the suppressed calyx-teeth; the minute broad-based entire petals with an involute apex; and the oblong terete fruit with a broad commissure, bifurcate carpophore, corky pericarp free from the seeds, sharp and slightly-winged primary ridges, and numerous vittæ. For comparative purposes it is better to consider the vegetative characters of the plant, which are those that most exhibit its adaptation to its environment, as specific. The plant is less than a foot high, with a creeping, perennial, somewhat woody rhizome, and an ascending, flexuous, striate, solid, and but seldom branched aerial stem. Both stem and leaves are fleshy in texture and smooth. The leaves are bi- or tri-ternate, with long membranous sheaths, short petioles, and thick, acute, terete, awl-shaped, or sub-fusiform leaflets. The umbels terminate a stout fleshy peduncle and are flat or convex, the general effect of their pedicels and unripe ovaries being a yellowish-green, though the minute petals are white. The anthers are



THE SAMPHIRE—continued.

yellowish, and the disk white, at first depressed but becoming afterwards pyramidal. The recurved styles crown the globose fruit, which becomes a deep purple.

Crithmum maritimum Linné ranges from the Crimea round the coasts of the Black Sea, the Mediterranean, and the North Atlantic to the Canaries, Ireland, and the south-west of Scotland, but not north of Kent on the east of Britain. It is interesting that the earliest record of the species as British should be from Dover. This is Turner's, who, in his "Names of Herbes," writes :—

"Crithmus named also crithamus & Batis is called in englishe Sampere, it is named of some Herbaries creta marina, it groweth much in rockes & cliffes beside Douer."

Gerard gives the same locality, and adds, *inter alia*, that the plant has a

"smell delightful and pleasant" and is "of a spicie taste, with a certaine saltnesse." "The leaves," he continues, "kept in pickle and eaten in sallads with oile and vineger is . . . the pleasantest sauce, most familiar and best agreeing with man's bodie for digestion of meates."

It does not, however, follow that Shakespeare in introducing the plant in the magnificent passage in "King Lear," as growing at Dover, had read either Turner or Gerard. Dover Samphire may have been as well known in the London shops of his day as are Dover soles at present. The plant may occasionally be found, as at Porth Gwylan, Carnarvonshire, growing abundantly in fields near the sea; but it is certainly more frequent on cliffs above high-water mark but within reach of the spray. Hence we have numerous references to what Shakespeare calls the "fearful trade" of the cliffsmen who collected it. John Philips, in his now forgotten "Cider," writes :—

"Nor untrembling canst thou see
How from a craggy rock, whose prominence
Half overshades the ocean, hardy men
Fearless of rending winds and dashing waves,
Cut samphire, to excite the squeamish gust
Of pamper'd luxury."

Smith, in his "History of Waterford," says :—

"It is terrible to see how people gather it, hanging by a rope several fathoms from the top of the impending rocks, as it were in the air";

and Bromfield records that the cliffsmen, who in his time collected it "at great personal risk," paid an annual tribute for the privilege to the lord of the manor of Freshwater. The most striking illustration of the precise habitat is the story told by Burnett of a wreck near Beachy Head in 1821. A small party of survivors, clinging to a ledge of rock in the storm while the tide was rising, were just about to risk their lives in the attempt to swim to land, when one of their number, seeing a plant of Samphire below them, assured them that the sea would not rise as high as their foothold, since Samphire never grows within reach of submergence; and, trusting in his botanical knowledge, they were saved.

CXCVI.—THE COW-PARSNIP.

Heracleum Sphondylium Linné.

THE Tribe *Peucedaneæ* comprises many of the largest *Umbelliferae*. In many steppes or semi-deserts and prairies they tower above other herbaceous vegetation, and may then be seen in the full symmetry of their rosettes of large radical leaves, stout ascending though hollow branches, and grand spreading terminal umbels. Such are the Giant Fennels (*Ferula*) of the Mediterranean region, North Africa, and Central Asia; the great Angelicas of Kamtschatka; and the grand Cow-Parsnips of the same country, of Persia, and the Caucasus; several of which are now favourite ornaments of our shrubberies.

The genera of this Tribe agree in having their fruits much compressed dorsally, or, as it is also termed, antero-posteriorly, with the lateral ridges of the two carpels closely appressed and broadened into a wing, while the other ridges are reduced to slender threads. The genus *Heracleum*, the Cow-Parsnips, is distinguished from the true Parsnips (*Pastinaca*) by its white flowers, and by the club-shaped oil-vittæ which are not as long as the fruit. It comprises some seventy species, belonging to the North Temperate Zone and some mountains farther to the south. They are more or less hairy, coarse-growing, biennials or perennials, their beauty being that of general outline, not that of delicate texture. Their leaves may be pinnate, bipinnate, or tripinnate, but have broad lobes: they have large, many-rayed compound umbels with deciduous bracts, and the outer flowers very much modified in their symmetry. Instead of the normal five equal petals, which occur in the more central flowers of the umbel, these outer "radiant" flowers, as they are termed, have become monosymmetric. The outermost petal has its apex deeply inflexed, so that it is divided into two large equal lobes: the two petals right and left of it are alike, each being inflexed and forming two very unequal lobes; whilst the two petals nearest the centre of the umbel are much smaller and symmetrical. In this way a large peripheral surface of white petal is secured for the umbel, rendering its many individually small flowers collectively conspicuous to insects.

The densely hairy surface of the coarse leaves of our one British species (*H. Sphondylium* Linné) does not suggest that the plant would be edible by man or attractive to animals; nor in this Family do we expect the secretion of much sugar without acidity. If then, as is alleged, the usefulness of these plants was detected by the demigod Herakles, whose botanical knowledge was presumably acquired from his tutor the centaur Chiron, he is justly commemorated in the name *Heracleum*. Pliny has, however, confused various plants under this name. The name *Σφονδύλιον*, *Sphondulion*, the original of Linné's specific name for the plant, occurs in Dioscorides, and is apparently connected with *σφονδύλη*, *spondule*, the name of some evil-smelling beetle; and when we have seen the broad umbels of the Cow-Parsnip in our summer hedgerows crowded with scarlet Soldier-beetles we



THE COW-PARSNIP—continued.

have sometimes wondered whether this was the insect from which the name had its origin.

Crowded among other plants in the hedgerow, the Cow-Parsnip cannot well display all its dignity of outline ; but Fuchs seems to have recognised the fine outline of the large leaves when he called the plant *Acanthus germanica* ; and it was probably in this way that the popular name *Bear's Breech* was transferred to it from the true *Acanthus*. *Bear-skeeters*, a Scottish name for it, however, has quite a different origin, and should, perhaps, preferably be written *bere-skeeters*, *i.e.* barley-shooters, children blowing ears of barley through the hollow stems.

The stout tap-root, which is occasionally branched, is slightly mucilaginous and, like the whole plant, rich in sugar, and may well have suggested its classification—which proves true to real botanical affinity—with the Parsnip (*Pastinaca*), the last syllable of which name was mistaken for *naep* (*napus*), a turnip. Turner, in his "Names of Herbes," says of it :—

"Sphondilium is called in duche wyld Pateney,* or wyld Berenklawe, in frenche Panate sauage. It may be called in englishe Cow-persnepe or rough Persnepe. It groweth in watery middowes and in ranke groundes about hedges."

This is the origin of one of the commonest modern names for the plant, the prefix "cow-," perhaps, merely signifying rough or coarse ; but Dr. Prior suggested that another name, *Madnep*, has been entirely misinterpreted, being truly only mead-nape or meadow-parsnip, whereas by understanding *parsnep* or *pasnep* to be the Italian *pazzo napo*, mad turnip, we have the basis of Gerard's assertion that

"if a phreneticke or melancholie man's head be anointed with oyle wherein the leaves and roots have been sodden, it helpeth him very much."

The young shoots are said to be very good if boiled and eaten as asparagus ; whilst the sugar that exudes from the peeled stems of some Siberian species is distilled with cranberries into a liqueur. It is, no doubt, this saccharine quality that gives the plant its value for fattening pigs, for which purpose it used to be collected and to which it owes such names as *Hogweed*, *Pigweed*, *Pig's Parsnip*, *Pig's Cole*, and *Eltrot* (from *elt*, a young pig, and *root*).

Most of the other popular names of the plant, such as *Clogweed*, *Kesh*, and *Kex*, refer merely to the hollow stems.

In early summer the great inflated leaf-sheaths of a pale green, held aloft like balloons, are striking objects in our fields before the umbels burst from them ; but when the plant is in full blossom, though it cannot equal the grandeur of its giant Siberian congener, the Cow-Parsnip is unquestionably a striking plant ; whilst the big clusters of light brown or almost bleached fruits held up against autumn skies form a picturesque feature in the chill landscape of that season.

**i.e.* Pasteney (*Pastinaca*).

CXCVII.—THE UPRIGHT HEDGE-PARSLEY.

Torilis Anthriscus Gmelin.

THE Tribe *Caucalineæ* includes the Corianders, Cumin, Carrot, and Bur and Hedge Parsleys (*Caucalis* and *Torilis*), the last two, closely related genera. They have compound umbels ; both primary and secondary ridges on the carpels, the four secondary ones being the more prominent and prickly ; and the vittæ solitary in the furrows between the primary ridges.

Sir Joseph Hooker and many other botanists include the Bur-Parsleys and the Hedge-Parsleys in the one genus *Caucalis*. Its name, dating from Hippocrates, the "Father of Medicine," who was born in the island of Cos in 459 B.C., and died 361 B.C., is said to be derived from κέω, *keo*, I lie down, and καυλός, *kaulos*, a stem, though this does not seem very appropriate. It comprises, in this widest sense, less than a score of species, natives of Temperate Asia, Europe, and North Africa. They are all annuals and hispid, with pinnate leaves, umbels usually few-rayed, and white or reddish flowers which are polygamous and the outer ones often radiant. There is a conical, lobed disk, a spinous ovoid fruit with an oil-vitta under each secondary ridge, and a narrow commissure.

When, as in the authorities whom we follow here, *Torilis* is treated as a genus distinct from *Caucalis*, the Hedge-Parsleys from the Bur-Parsleys, the main distinction between the two genera is that in *Caucalis* (in the restricted sense) the fruit spines are in one, two, or three rows on the secondary ridges, whilst in *Torilis* there are bristly primary ridges and numerous bristles covering the space between the primary ridges. It has been suggested that the name *Torilis* is connected either with τορεύω, *tureuo*, I carve or emboss, or with τόρνος, *torinos*, a round ; but neither etymology points clearly to any particular character. The name was, moreover, a coinage of the French botanist Adanson (1727-1806), who frequently makes use of purely meaningless combinations, so that it may have no derivation at all. Although the significance of a name may often serve as a useful reminder of some character possessed by the plant that bears it, a name is pre-eminently a mere label for identification, so that these arbitrary names, though uninformative, must be accepted as admissible.

The various species of this genus are rough, with close-set, rigid bristles ; and have a branched, furrowed, and leafy stem, bipinnate leaves, narrow bracteoles, and white or pink-tinged flowers. The flowers are nearly all perfect and have short, broad, acute, persistent sepals, obcordate petals with inflexed points, and subulate, spreading, persistent styles. The thick covering of erect, appressed, rigid, subulate prickles on the fruit conceals the ridges.

Our common species *T. Anthriscus* was so named by Charles Christopher Gmelin in his "Flora Badensis-Alsatia," published between 1805 and 1808. It was the *Caucalis Anthriscus* of Hudson, and in pre-Linnæan times had been known by



THE UPRIGHT HEDGE-PARSLEY—continued.

such a distinctive name as *Caucalis semine aspero, flosculis rubentibus*, the Bur-Parsley with rough fruit and reddish florets, which was used by Bauhin. The name *Anthriscus* seems to be a diminutive from ἀνθηρός, *antheros*, flowering. It is used by Pliny.

The stiff, erect stem is solid, striate, branched, and beset with reflexed bristles, and reaches a height of two or three feet. Following the arrangement of the leaves, the branches, which spring from their axils, are given off singly from the nodes and rise nearly vertically. The leaves are soft to the touch, the lowermost ones being on long channelled petioles. The umbels are both lateral and terminal, on long, erect peduncles, with short, rough, persistent bracts, as well as bracteoles, and from five to twelve rays. The outermost of the minute, usually tinted, flowers are slightly radiant and the central ones are frequently staminate. The styles lengthen and diverge after fertilisation and the fruit is often reddish.

Though very common, in hedgerows and at the borders of fields, this plant can hardly be said to have sufficiently marked distinctive features to have acquired popular names exclusively its own. It is most commonly called *Hedge-Parsley*: *Hogweed* it shares with *Heracleum*: *Hemlock Chervil* is not very distinctive; but *Rough Chervil*, *Rough Cicely*, or the very local *Lady's Needlework* of Cheshire—a pretty allusion to the delicate cut foliage—are rather more so.

The flowers do not seem to be very much visited by insects; and, since authorities differ as to whether the stamens or the stigmas are the first to mature in the perfect flowers, it is probable that there is not much difference of time between them, and possibly—as is certainly the case in other instances—the plant may be protandrous in some regions and protogynous in others.

Although the bristles on the fruit are not hooked, they are sufficiently close set to serve as some protection, possibly against birds; but they would not prove very effective as a bur to bring about the dispersal of the fruit by animal agency.

CXCVIII.—ANALYTICAL DRAWINGS OF THE IVY AND PARSLEY FAMILIES.

(*Araliaceæ* and *Umbelliferae*.)

THE two considerable Families of which some representatives are analysed on this Plate are both very obviously allied and almost as obviously distinguishable. Both have scattered leaves and umbellate inflorescences ; both have flowers for the most part individually small, pentamerous and polysymmetric, perfect and epigynous, with a single whorl of stamens, and pendulous anatropous ovules becoming albuminous seeds. The *Araliaceæ*, however, are mostly tropical trees or shrubs with five carpels, forming a drupaceous fruit or berry ; while the *Umbelliferae* are mostly herbaceous, belonging mainly to the North Temperate Zone, and have a *cremocarp*, or dry fruit of two carpels, which usually separate, when ripe, into two indehiscent mericarps.

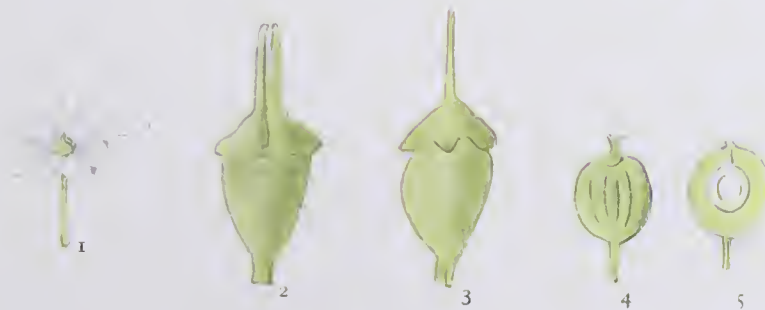
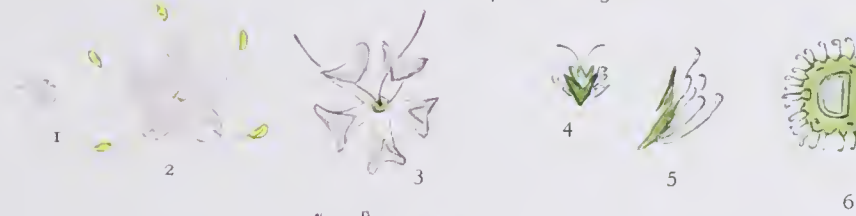
Although other species have sometimes been referred to it, the Family *Araliaceæ* is now solely represented among British plants by the Common Ivy (*Hedera Helix* Linné), dissections of which form the first line of figures on the Plate. Fig. 1 is a flower, very slightly enlarged, the reflexed petals concealing the minute sepals ; Fig. 2 is an enlargement of a flower with the petals removed ; Fig. 3, the “berry,” natural size ; and Fig. 4, a flower in longitudinal section, showing two of the carpels and the undivided style which is characteristic of the Family.

As will be seen in the other seven rows of figures, considerable uniformity, at least in number and relative arrangement of the parts of flower and fruit, characterises the *Umbelliferae*.

The second line of figures represents the Marsh Pennywort (*Hydrocotyle vulgaris* Linné), Fig. 1 being a flower of natural size ; Fig. 2, the same enlarged, with a bracteole below it ; Fig. 3, one of the incurved petals enlarged ; Fig. 4, an unripe fruit enlarged, showing the ridges and divergent styles ; and Fig. 5, a cross section of the fruit, showing the narrow commissure and pentagonal carpels.

The third line of figures deals with the Sea Holly (*Eryngium maritimum* Linné). Fig. 1 is an enlarged view of a flower and a bracteole ; Fig. 2, two of the stamens ; Fig. 3, the incurved petal ; Fig. 4, a much enlarged view of the fruit in longitudinal section ; Fig. 5, a less enlarged view of the exterior of a fruit, both the last two showing the persisting leafy sepals ; and Fig. 6, an enlarged transverse section across the fruit.

The fourth line of figures represents the Wood Sanicle (*Sanicula europæa* Linné), Fig. 1 being a single flower, natural size ; Fig. 2, one of the outer flowers of the umbel, which is exclusively staminate, enlarged. It shows the inflexed points of the petals and the very long filaments of the stamens. Fig. 3 is an inner flower, either exclusively carpellate, or at least in the later, carpellate, stage of development, showing the petals differing in form and the two long styles. Fig. 4 is a side view



ANALYTICAL DRAWINGS OF THE IVY AND PARSLEY
FAMILIES—continued.

of such a flower, little more than natural size ; Fig. 5 is an enlarged side view of part of the surface of the fruit, to show the hooked bristles ; and Fig. 6, a transverse section through the whole fruit, shows both these bristles and the oil-vittæ in the pericarp.

The fifth line of figures illustrates the Shepherd's Needle (*Scandix Pecten-Veneris* Linné), Fig. 1 being a single flower seen from above and slightly enlarged, showing the bilobed petals, one of which is "radiant" or enlarged. Fig. 2 is a side view of a flower, showing that the "beak" of the receptacular tube has already elongated ; Fig. 3 gives two views of a fully-formed fruit crowned by the styles ; Fig. 4 shows the ripe cremocarp dehiscing into two mericarps, these three figures being natural size ; Fig. 5 is a transverse, and Fig 6, a longitudinal, section of a mericarp, the former showing the vittæ, whilst in the latter the upper part of the beak has been omitted.

The figures in the sixth line are those of the Fennel (*Fœniculum vulgare* Miller), Fig. 1 being an enlarged view of a flower as seen from above ; Fig. 2, a longitudinal section, omitting the stamens but showing clearly the broad inflexed points of the entire petals, the two pendulous and anatropous ovules, and the two styles. Fig. 3 is a fruit, natural size ; Fig. 4 shows the same, slightly enlarged, with mericarps separating from a Y-shaped carpophore ; and Fig. 5, a more enlarged transverse section.

The figures of the penultimate row are those of the Rock Samphire (*Crithmum maritimum* Linné). Fig. 1 shows a flower in side view ; Fig. 2, the same as seen from above ; Fig. 3, two of the incurved stamens and petals ; Fig. 4, a fruit ; and Fig. 5, the same in transverse section, all the figures being enlarged.

The figures in the last line represent the Cow-Parsnip (*Heracleum Sphondylium* Linné). Fig. 1, one of the outermost flowers of the umbel, natural size, shows the marked monosymmetry produced by the symmetrical enlargement of one bilobed petal and the unsymmetrical enlargement of the two on either side of it. Figs. 2 and 3 are enlarged views of the ovary, disk, and styles, at an early stage, seen from different aspects ; Fig. 4 is an unripe fruit, natural size ; and Fig. 5 shows one carpel with its commissural face removed, so as to disclose the seed.

CXCIX.—THE DOGWOOD.

Cornus sanguinea Linné.

THE *Cornaceæ*, the third Family of the Order *Umbellifloræ*, belong, like the *Umbelliferae*, mainly to the North Temperate Zone, whilst, like the *Araliaceæ*, they are mostly woody plants. They have generally opposite, exstipulate, simple leaves; crowded inflorescences of small polysymmetric, perfect, and mostly tetramerous flowers; and an inferior drupaceous fruit with from one to four stony endocarps. The Family is represented in our gardens by the so-called Spotted Laurel (*Aucuba japonica* Thunberg), which is diœcious.

The genus *Cornus* includes nearly thirty species, some herbaceous, but the majority shrubby. Its small white or yellow flowers have four minute superior sepals, four valvate petals, four stamens, and a two-chambered ovary, with a single style, and one pendulous anatropous ovule in each chamber. It probably derived its name from the Latin *cornu*, a horn, from the horny texture of the wood. Of two species common in Europe, the larger, now generally known as the Cornelian Cherry, is mentioned by Homer, Virgil, and Theophrastus, and came to be known as the "male" (*Cornus mas* Linné). Its fruit, resembling a small plum, has a very harsh taste, but after being kept becomes pleasantly acid, and is used in Germany for preserves and in Turkey for flavouring sherbet, while the bark furnishes a red dye. Our species was known as the "female" (*Cornus fœmina*); while Pliny writes of it as *Virga sanguinea*, or Bloody Twig, with reference to the red shoots and foliage in autumn. Turner, in first recording it as a British plant, writes, in 1548, under the head of *Cornus* :—

"The female is plentuous in Englande & the buchers make prickes of it, some cal it Gadrise or dog tree, howe be it there is an other tree that they cal dogrise also."

He seems here to recognise that "rise" means a tree or shrub, but to have no suspicion of any identity of signification between *Gadrise* and *Dogrise*. Neither apparently had Gerard, who has *Dogberrie-tree* in the Catalogue of his garden (1599), and says in his "Herball" (1597) :—

"In the North countrey they call it Gaten tree, or Gater tree, the berries whereof seem to be those which Chaucer calleth Gater beries."

It is interesting to come across this reference to Chaucer in Gerard's "Herball"; but the passage in the "Nonnes Preestes Tale" to which it relates has the further importance that it indicates the use of the berries of the Dogwood as a laxative in the fourteenth century, while Philip Miller in the eighteenth records their being often brought to market and sold as those of the Buckthorn for the same purpose. Partelote, the hen, in Chaucer's poem, recommends Chaunticlere, the cock, to have "laxatives . . . of gaitre-berries."

Even Matthiolum, in 1554, while giving us the interesting information that the people of Trent extracted a lamp-oil from its berries by boiling, thinks it



THE DOGWOOD—continued.

necessary to add the marvellous statement that if persons bitten by mad dogs hold twigs of this shrub in their hands until they become warm they are driven mad. Parkinson, in the seventeenth century, says :—

“We . . . call it the Dogge berry tree, because the berries are not fit to be eaten, or to be given to a dogge” ;

and he adds that

“If one that is cured of the biting of a madde dogge, shall within one twelve moneth after touch the *Cornus fæmina*, or Dogge berry tree, or any part thereof, the disease will returne againe.”

Loudon, even, in 1835, suggests that the name was given

“from the astringent properties of the bark and leaves, a decoction of which was formerly used as a wash for curing the mange in dogs.”

This wash probably originated in the name of the shrub, a name which is unquestionably correctly explained by Dr. Prior, under the various forms of *Dagwood*, *Dag-tree*, *Dogwood*, *Dogrise*, *Prickwood*, *Skiver-wood*, *Skewer-wood*, *Gadrise*, *Gad-tree*, *Gaitre-tree*, *Gatten-tree*, *Gatteridge*, *Cat-tree*, *Catteridge*, and the modern *Houndberry-tree*, as referring to the use of the hard, tough, horny shoots of this species and of those of the Spindle-tree (*Euonymus europæus* Linné) and of our two species of *Viburnum*, the Guelder-rose (*V. Opulus* Linné) and the Wayfaring-tree (*V. Lantana* Linné), for making skewers, formerly known as pricks, goads, and dags or daggers of lath, such as the traditional weapon of Harlequin. The confusion of these various shrubs continues to this day in the gunpowder trade, in which they are employed for the manufacture of fine-grained charcoal. For this purpose the Alder Buckthorn (*Rhamnus Frangula* Linné) is now preferred and it is known as Dogwood.

Though not very particular as to soil, the Cornel is most abundant on the warm sub-soil of calcareous formations, especially on the Chalk. It does not occur in Scotland and is uncommon in Ireland ; but is very abundant in our south-eastern counties. It grows from four to twenty feet in height, its round straight branches spreading horizontally or ascending in opposite pairs, their downy surface changing in autumn and other seasons when affected by frost from olive-green to a vivid red. The opposite, short-stalked, ovate, and entire leaves vary from two to six inches in length and have prominent tough veins. In spring and autumn alike they are beautifully tinted with red ; but in the latter season they exhibit almost as many tints as does the leaf of the Muscat Grape. The bark and leaves have a strong fetid odour when bruised, to which the shrub owes its French name *bois punais*. The cream-coloured clusters of flowers are produced in June and July, the berries ripening in September from green to black.

The flowers are rich in honey and are visited by a variety of insects ; but, as they are homogamous, self-pollination is not prevented. Their perfume is not pleasant ; and the berries, though eagerly devoured by thrushes, are, like the rest of the plant, extremely bitter and astringent in taste.

CC.—THE WINTER-GREEN.

Pyrola media Swartz.

THE highly organised Order *Umbellifloræ*, with its massed flowers with adherent receptacular tubes, seeds well adapted for dispersal, and leaves often of a complex differentiation, has in most modern arrangements of Flowering Plants been taken as concluding the series of the *Polypetalæ*. In Engler's system, in which the old group *Incomplete* is merged with the *Polypetalæ* under the name of the Series *Archichlamydeæ*, it forms the last of twenty-three Orders, or, as they were once termed, Cohorts.

We now pass on to the still more highly organised Series *Sympetalæ*, in which, as the name indicates, the inner of the two perianth-whorls is almost always gamophyllous. In this group, which has previously been known as *Monopetalæ* or *Gamopetalæ*—all three names having really the same signification—Engler recognises nine Orders, only one of which, the mainly tropical *Ebenales*, is without British representatives. The first of our eight British Orders is the *Ericales*, which have usually polysymmetric perfect flowers, either tetramerous or pentamerous, generally with two whorls of stamens, which are seldom epipetalous. The ovary may be superior or inferior within the limits of a single Family. Three considerable Families are comprised in the Order, the mainly Australasian *Epacridaceæ*, familiar in our green-houses, and the two represented in Britain, the *Pyrolaceæ* and the *Ericaceæ*, which are so closely related to one another as to have been very generally united.

The *Pyrolaceæ* consist of some ten genera with thirty species, three genera, with six species, occurring in Great Britain. The Family belong to the Arctic and the colder part of the North Temperate Zone in both the Old and the New Worlds, not extending into India, Africa, or South America, and only represented in the mountains of Greece and Turkey. Two very different habits of growth occur within the limits of this Family: some of them, like the Yellow Bird's-nest (*Monotropa Hypopitys* Linné) of our Pine and Beech woods, are brownish saprophytes, living among dead leaves, with no green colouring-matter and with their leaves reduced to scales; whilst the others are biennial or perennial evergreen plants of no great size, with slender creeping rhizomes and mostly radical simple leaves.

Pyrola, the largest genus in the Family, belongs to the latter group. The short, unbranched stem is almost woody and the leaves are thick and smooth, with broad petioles. The name *Pyrola*, used from the time of Brunfels, whose "Herbarium" was published in 1530, is a diminutive from *Pyrus*, a pear, with reference to the form of the leaves in some species; whilst the name *Winter-green*, which is Turner's translation from the old German *Winter-grün*, refers to their evergreen character. The flowers are in a bracteate raceme and hang to one side of the peduncle, *i.e.* they are, as it is termed, "secund." Their parts are all in fives, the globose corolla being made up of orbicular petals, hardly united at their bases, strikingly "connivent" or



THE WINTER-GREEN—continued.

incurved, and white, pinkish, or yellowish in colour. The ten included stamens are hypogynous, with filaments which are at first curved outwards, *i.e.* towards the petals, and large anthers, each opening by two pores at their base. The anthers are kept in this position by the incurved petals; but when insect-visitors push back the petals the curvature of the filament changes to an inward direction and the anther becomes reversed, so that the pollen falls downward on to the insect. The pollen-grains remain permanently united into "tetrads," or groups of four, by the persistence of the walls of the "pollen-mother-cells," each of which gives origin to four grains. There is a single style divided above into five short lobes, and the ovary is five-chambered with numerous minute ovules springing from a spongy central placenta. The fruit is a globular capsule with the persistent calyx below it, and it splits loculicidally into five valves from below upwards, the margins of the valves being connected by a web of hairs. The seeds are minute, but elongated at both ends, with a loose testa, and so light as to be readily dispersed by wind.

There are some fifteen species, of which four, somewhat closely related, are natives of Britain. *Pyrola media* Swartz, for which Sir James Edward Smith uses the name *Intermediate Winter-green*, has its leaves crenate, its sepals shorter than the stamens, and the style straight and twice as long as the stamens, so that it projects considerably from the corolla. The stigma consists of a ring round the apex of the style below the five lobes, which are also receptive.

All the species are woodland or heath plants, occurring especially in the Pine-forests and Pine-heaths of the north. The Rev. E. A. Woodruffe-Peacock has an interesting note, in the "Journal of Botany" for 1914, with regard to the indication of Pine-woods no longer existing by the species of this genus.

"In Lincolnshire," he writes, "some most curious facts come out of a historical consideration of the position in the past of our only species, *P. minor*. The great block of parishes for which it is recorded lies on the eolian sands at the foot of the escarpment of the wolds for a distance of eight miles north and south of Market Rasen. Now on these sands *Pinus sylvestris* grew as a self-sown species from prehistoric times till about 1840, if not later. Beyond this area *Pyrola* is found in a few isolated spots. These places are worth careful study to see whether it is a good and safe index species of ancient, but now departed, pines in this county."

Like not a few plants which flourish in acid humus, the species of *Pyrola* have astringent and tonic properties; but they are not now in any way utilised.

CCI.—THE MARSH ANDROMEDA.

Andromeda Polifolia Linné.

THE Heath Family or *Ericaceæ*, represented by this and the five following Plates, is a group of considerable variety, seeing that it comprises some fifty genera and more than thirteen hundred species. They are, however, more prominent in the vegetation of the globe than these figures suggest, from the fact that some of them grow socially, so that large tracts of country are covered by one or two species and are known from them as "heaths." Represented in most parts of the globe, except in desert regions and the hot moist intertropical areas, they are specially abundant in certain countries from which many species with beautiful flowers have been brought to our gardens. Thus many of them are known as "Cape Plants," whilst other genera are so distinctively North American as to have given rise to the name of "American garden" for the peaty borders in which they are cultivated. Their geographical distribution is of great interest, since they seem—during recent geological periods at least—to have radiated from very different centres, from Northern polar regions and from South Africa alike.

Most of them are perennial evergreen, wiry undershrubs, shrubs, or trees, with leathery and often rigid, opposite or whorled, simple, entire leaves. The slow-growing, wiry habit and the frequently small size, inrolled edges and adpressed position of the leaves, are the expression of the xerophytic character of the Family as a whole. Living, as most of the species do, either in poor porous sands, or thin-soiled mountain-sides, or in peaty soils rich in humus, but often acid, they are almost all under the necessity of economising their water-supply. Thus the leathery leaves, to diminish transpiration, have a thick cuticularised upper epidermis; their stomata are confined to the under surface and are protected from the sun's heat by the extensive inrolling of the edges; while there is sometimes a special water-storing tissue in the interior.

The flowers are mostly in bracteate, racemose inflorescences, perfect, and polysymmetric, either tetramerous or pentamerous, with two whorls of stamens, a honey-secreting disk, and a simple style. The corolla is usually bell- or barrel-shaped: the anther-chambers open by pores at their apex: the pollen-grains are united in tetrads; and there are often special appendages to the anthers connected with the mechanism of insect-pollination. Most of our British representatives of the Family have pendulous flowers, adapted for pollination by bees hovering below them. The insect first touches the projecting stigma, parting with pollen that may be on its head or back, and then, probing for the honey at the base of the bell-shaped corolla, inevitably touches the stamens or their projecting awns, and so brings down a shower of the aggregated pollen-grains from the terminal pores of the anthers.

Drude divides the Family into four Sub-Families:—the *Rhododendroideæ*, including the Rhododendrons, Azaleas, and Kalmias, which have a deciduous corolla,



THE MARSH ANDROMEDA—continued.

no appendages to their anthers, and, very often, a loose winged testa to their seeds ; the *Arbutioideæ*, including *Andromeda* and *Arbutus*, with deciduous corolla, appendiculate anthers, and no wings to their seeds ; the *Vaccinioideæ*, with deciduous corolla, appendiculate anthers, wingless seeds, and an inferior ovary ; and the *Ericoideæ*, with a persistent corolla, anthers generally appendiculate, superior ovary, dry fruit, and round wingless seeds.

Andromeda is a genus comprising plants varying much in size and Arctic-alpine in distribution. It has a valvate calyx of five sepals which persists in the fruit stage, an urceolate corolla with five minute teeth, ten stamens, and a dry capsular fruit with five chambers, which bursts loculicidally into five valves. The leaves of our one little British species were compared by the early botanical writers to those of Rosemary, its flowers to those of the *Arbutus*, and its capsule to that of *Cistus*. Such book-names as *Marsh Rosemary* have accordingly been proposed for it ; but the plant is, perhaps, too rare to have attracted much popular notice. The name *Polifolia*—once generic and now specific—refers to the polished upper surface of the leaves, though their dark blue-green colour above, turning to vivid red in autumn, inrolled margins, and glaucous under surface are even more noticeable. Their form, points, and texture seem a protection against injury by snow.

As the painter and the sculptor delight to embody their ideals of beauty in representations of the fabled heroines of Classical mythology, so botanists have been pleased to bestow the names of these lovely women upon the modest beauties of the plant world. With a fancy which was one of his most remarkable characteristics, Linné saw in the surroundings of this little flower of northern peat-bogs, growing on “turfy hillocks in the midst of swamps frequented by toads, and other reptiles,” some resemblance to those of the beautiful daughter of Cepheus, king of Ethiopia, whose figure, chained on a rock, that she might be devoured by a sea-monster, is so familiar to every student of modern art. So too Sir William Hooker, echoing the mood of the master, tells how in Scotland “this beautiful tribe of plants grow in dreary and northern wastes, feigned to be the abode of preternatural monsters.”

Within the delicately blushing bells, the ten stamens present a remarkable form. They have a subulate filament clothed with hairs which serve apparently to hold the honey secreted by a ring of hypogynous glands : the chocolate-brown anther suspended from its apex opens by two sub-terminal pores which are pressed at first against the style ; and from the apex of each anther project two long curved awns which generally cross one another and radiate outward towards the corolla, like the spokes of a wheel.

As in the case of the Violet, so here, Ruskin's notion of the appropriateness of female names for harmlessly beautiful plants is at fault, for *Andromeda Polifolia* is an acrid narcotic and is said to prove sometimes fatal to sheep.

CCII.—THE STRAWBERRY-TREE.

Arbutus Unedo Linné.

BROAD-LEAVED evergreens dread frost and are thus characteristic of warm climates or of those insular conditions in higher latitudes where frost is rare, rather than of the interior of continents, where, though the summer may be hotter, the winter is also colder. This determines the geographical distribution of the Strawberry-tree (*Arbutus Unedo* Linné). It is common all round the Mediterranean from Syria, Anatolia, the Archipelago, Thrace, Greece, and Dalmatia, to southern Italy, Algeria, Spain, and the Cevennes. In the Tell, or cultivated coastal, region of Algeria, it flourishes in the brushwood under the shade of the Cork Oak, and it is particularly abundant in the maquis of Corsica. It extends along the coast of Portugal and the Landes of Bordeaux as far north as Rochelle ; but it cannot stand the cold winter of Paris. It has naturalised itself, growing freely from self-sown seed, on the warm moist slopes above the Bristol Avon at Clifton ; and it has long flourished in the neighbourhood of Killarney.

In the latter locality, where it exceeds thirty feet in height and two feet in the girth of its stem, it had acquired the name *Cane-apple* prior to the first English record of its occurrence there. That, however, was not until Parkinson's "Theatrum Botanicum" in 1640, while the suggestion of those who do not believe it to be truly wild, is that it may have been introduced either by the followers of St. Finian, the leper of Innisfallen, at the close of the sixth century, or by the Franciscans, who founded Muckross Abbey in the fifteenth. Professor Charles Babington in 1835 came to the conclusion that the *Arbutus* was indigenous at Killarney, and Mr. Edward Step writes, in 1904, of finding it "in the woods at Woodstock, Co. Kilkenny, in a situation where it seemed unlikely such a tree would be planted." Considering, however, the extent to which this species has established itself at Clifton, that the climate of Kerry certainly suits it, that its fruit is greedily eaten by birds and its seed so dispersed, and that *ex hypothesi* it may have been introduced four or even eleven centuries ago, we feel bound to admit that the introduction theory is at least tenable. If, on the other hand, we attribute the existence of the tree in Ireland to natural causes, it affords an illustration of one of the most far-reaching speculations of modern geography, which was put forward by Hewett Watson in 1832 and independently by Edward Forbes in the year following. If we look at a map showing the 100-fathom line around the submerged plateau upon which the British Isles stand, we shall see that this sounding sweeps from the north-west coast of the Asturian provinces across the Bay of Biscay and then turns, considerably to the west of Brittany, towards the coast of Kerry. If then, in a former age, when the whole of north-western Europe stood more than 600 feet relatively higher with regard to the sea, so that there was a land connection between Ireland and the Asturias, the *Arbutus* spread, with other species, along this ancient littoral as it does along



THE STRAWBERRY-TREE—continued.

that of the Landes to-day, it may never have spread so far eastward as Brittany or Cornwall because those regions, now maritime, were then, as Paris is now, relatively continental.

Theophrastus wrote of the tree, under the name κόμαρος, *komaros*, as not growing to a large size, but having an edible fruit, a leaf intermediate between those of the *Ilex* and the Bay, and each blossom equalling in size and form a long Myrtle blossom, so that it is formed like an egg-shell cut in half. Parkinson gives an excellent description of the rugged red bark, the flowers “formed like unto little bottles, or the flowers of Lilly convally,” and the “rounde berrys, greene at the first, yellowish afterwards, and of an excellent reddish colour, and somewhat hoary withall being full ripe . . . like a pallide clarret Wine, of an austere taste.”

Arbutus is one of our latest plants to flower, its loose pendulous clusters of creamy bells not opening till September or October. The bells are less than half an inch across, and within each of them ten tiny stamens spring from below the hypogynous honey-secreting disk. Each stamen consists of a short, stout, subulate, hairy filament and an anther with two awns nearly at right angles to one extremity and a single viscid-pointed appendage at the other. At first the filaments bend outwards towards the corolla, the awns hanging towards its base, whilst the viscid point is cemented low down on the style. A change in the direction of growth of the filaments then takes place, and they bend inwards as they lengthen, towards the central column-like style, causing the anthers to revolve through about 120° on the point cemented to the style, until their awns point towards the mouth of the corolla-tube and their blunt ends are pressed against the style. Then, while the viscid point has separated from the style and has been absorbed, a thin membrane closing the pore of the anther also disappears, so that the pollen is only kept in by the contact of the anther with the style. The blossoms are much visited by bees, wasps, and the later butterflies and moths, which, hovering beneath them to suck the honey clinging to the hairs on the filaments, cannot fail to touch some of the twenty awns radiating from the style like the spokes of a wheel, and thus tear away the anther from its contact with the style, so that the pollen falls upon them.

The round five-chambered berries, which contain from twenty to twenty-five seeds, do not reach the orange-scarlet of ripeness till fourteen months after the fall of the corolla, so that the tree has the attractions of flower and fruit at the same time. The surface of the berry, more like the fruit of the Litchi than that of the Strawberry, rises into numerous points, connected with a wondrous web as of the clearest spun glass.

CCIII.—THE WHORTLEBERRY.

Vaccinium Myrtillus Linné.

THE Sub-Family *Vaccinioideæ*, which Drude places between the *Arbutoideæ* and the *Ericoideæ*, and of which *Vaccinium* is the principal genus, has long been a stumbling-block to the systematist. Closely allied in habit, foliage, corolla, stamens, and even in the general character of the fruit to such members of the *Arbutoideæ* as the Bearberry (*Arctostaphylos Uva-ursi* Sprengel), it differs in having the ovary inferior. Structurally this merely means that the floral receptacle instead of being to some extent convex, so that the floral leaves succeed one another upon it at successively higher levels, is hollowed and adherent to the carpels which are sunk in the hollow. Systematists have, however, been slow to grasp the fact that structural characters which are of the greatest importance as differentia in one group of plants may be of quite secondary significance in another group. The presence or absence of cohesion, for example, between the petals or perianth-leaves may, as among Dicotyledons, distinguish major divisions of the Class, whilst in the *Liliaceæ* it is only of generic importance; and it is only now that botanists are grasping the conclusion that the inferior ovary which separates the *Amaryllidaceæ* from the *Liliaceæ* cannot, in the face of practical identity in all other characters, place them very far apart. So too when Sir James Edward Smith wrote of the genus *Vaccinium*,

"It is an insurmountable stumbling-block in the way of all received principles of natural classification,"

it was simply that he did not comprehend the basis of those principles. Many other systematists have felt obliged to separate this genus, and its immediate allies which also have the inferior ovary, in a distinct Family or Order.

The genus *Vaccinium*, the name of which (used by Pliny) is probably a corruption of *Baccinium*, referring to the numerous berries (Latin *baccæ*), comprises about a hundred species, all natives of the Northern Hemisphere and especially of mountainous and marshy areas, where there is a considerable acidity in the humus. They are small shrubby plants with scattered, simple, and often evergreen leaves; drooping, white or reddish flowers secreting honey; four or five sepals and as many petals united in a bell; two whorls of stamens with their anther-chambers prolonged upwards into tubes ending in the pores; and a globose, four- or five-chambered, many-seeded, edible berry.

There are four British species, the Cranberry (*V. Oxycoccus* Linné), a trailing evergreen, growing in mountain peat-bogs, with revolute leaves, a bright red, rotate, four-cleft corolla, no awns to the stamens, and dark red berries; the Cowberry (*V. Vitis-Idæa* Linné), a somewhat similar form, also evergreen, but with a bell-shaped corolla, with no awns to the stamens and with obovate leaves; the Bog Whortleberry (*V. uliginosum* Linné), deciduous, with cylindrical branches, leaves entire and glaucous on their under surfaces, a globose pale pink corolla, awns to the anthers, and a blue berry; and the Whortleberry (*V. Myrtillus* Linné).



THE WHORTLEBERRY—continued.

This species, which is represented on our Plate, was described as *Vitis Idæa*, the Grape of Mount Ida, by Daléchamps in 1586, and as *Myrtillus*, the little Myrtle, by several of the early botanists. The latter name may refer partly to the form of the leaves, the Myrtle (*Myrtus communis* Linné) being, from an early date, a plant familiar in cultivation throughout Europe, or wholly to the fruit, the Myrtle-berry having been commonly imported in mediæval times and employed both in medicine and in confectionery. This is the origin of the name *Whortleberry* or *Hurtberry* and of the local form *Huckleberry* which, familiar to some of the Pilgrim Fathers of New England, has become the general American name for various allied species. France has the name *Myrtille*, while the German *Heidelsbeere* is the equivalent of our *Whinberry* or *Whimberry*, the berry on heaths: *Bilberry*, like the Danish *Billebær*, means the dark or black berry; and our northern *Blaeberry*, or blue berry, appears also in the Icelandic *Blaber*.

The smooth polished and angular green branches assist the leaves as organs for the assimilation of atmospheric carbon-dioxide; while the small, thin, erect leaves, with their polished surfaces and serrate margins, are typical examples of the "snow-leaves" which are adapted to separate the crystals of occasional snow-flakes, so that they may melt without damaging the leaf. When young, the leaves are of a lovely rosy hue and in autumn they often turn to a vivid scarlet. The wax-like flowers, produced from April to June, are solitary and vary in colour from a pale greenish white to a deep red. The five sepals at the summit of the top-shaped inferior ovary are scarcely discernible, and the corolla is so constricted at the mouth of its bell as to leave a very narrow entrance for the proboscis of honey-seeking insects. A plentiful supply of honey is, however, secreted by a ridge round the summit of the ovary and attracts many humble-bees and especially the wasp *Vespa rufa*. The stout filaments of the ten stamens spring from between this "epigynous disk" and, curving inwards, forcibly press the pores of the anthers against the columnar style. The anther-chambers resemble long-necked retorts with outward-curving awns at the junction between the body of the anther and the tubular neck. The stigma projecting at the mouth of the corolla still further narrows the opening and is bound to receive any pollen on the head of the visiting insect. The dark blue, or very rarely white, berry is protected from wet, like the fruits of the Plum and the Grape, by a glaucous excretion of wax or bloom, and is an important article of food for the game birds of moor and woodland, by which means the seeds are widely dispersed.

Preferring peat or siliceous to calcareous soil, this species extends to altitudes of 4,000 feet in Scotland; but is dwarfed when above 3,000 feet. It forms a strikingly characteristic feature in several very different types of vegetation—on heaths, sometimes pale and stunted under the Ling; growing but not flowering under Beech; as a dominant species in dry Oak woods; or with Bracken under Pines; on exposed peat-moors; or bare rocky granite mountain-sides.

CCIV.—LING.

Calluna vulgaris Hull.

THE Sub-Family *Ericoideæ* are mostly wiry undershrubs with that type of minute xerophytic leaf which is specially designated as “ericoid,” with a persistent corolla, with their anther-chambers diverging at their upper ends, and with a capsular fruit. The ericoid leaf is small, but often closely imbricate, evergreen, and leathery, with inrolled edges often fringed with hairs. This structure, by merely reducing transpiration to a minimum, would render its possessors capable of resisting drought in hot, dry climates such as many of them have to endure in South Africa ; but it is even better adapted for cold, damp, mountain air. The low temperature of the soil-water or its acidic character may often limit the water-supply that the plant derives from its roots ; but the stomata, opening into the space enclosed by the inrolled edges, are protected from the light which would cause them to transpire freely, whilst at the same time, being protected by the hairs, they are not liable to be choked by moisture, whether dew, mist, rain, or melting snow, but can perform their restricted function directly the sun comes out, or even actually during rain. In Ling it has been noticed that the leaves, which are as a rule closely adpressed to the stem in four vertical rows—giving the shoot a four-sided appearance, and are thus further protected from direct sunlight—diverge when the plant is growing in shade so as to receive some light.

The distinctive features of the genus *Calluna* are the quadripartite membranous coloured calyx, deceptively surrounded at its base by four green bracts and exceeding in length the bell-shaped, four-cleft corolla ; and the septicidal and septifragal capsule. Translating these two associated technicalities, it may be explained that four valves separate from the ripe four-chambered capsule, opening at the septa between the chambers, but leaving the septa themselves attached to the large central axis. Adopting Dioscorides’s name *Ἐρείκη*, *Ereike*, Linné called the Ling, *Erica vulgaris* ; but Richard Anthony Salisbury felt compelled to separate it, in 1802, on account of the above characters, from the other Heaths ; and Smith, who was generally unwilling to recognise his rival’s work, could not but agree.

“Although,” he writes, in his “English Flora,” in 1828, “there is but one known species of this genus, the most common, if not perhaps the original, *Erica* of Dioscorides, Tournefort, or Linnæus, its generic distinctions are so very important that I gladly concur with Mr. Salisbury, who first pointed out those distinctions. To avoid the inconvenience of giving a new generic appellation to the hundreds of plants, familiar to everybody as *Ericæ*, or Heaths, he has judiciously called our common Ling, *Calluna*, from *καλλυνω* ; which is doubly suitable, whether, with Mr. Salisbury and Dr. Hull, we take it to express a *cleansing* property, brooms being made of Ling ; or whether we adopt the more common sense of the word, to *ornament* or *adorn*, which is very applicable to the flowers.”

Ling grows a foot or two in height, branching freely, its leafy shoots extending beyond the raceme of flowers which hang mainly to one side of the shoot. The leaves are about a fourteenth of an inch in length, in opposite decussate pairs. They are sessile, acute, and so keeled as to be almost triangular in section, slightly produced in basal lobes so as to be approximately arrow-shaped, and varying in



LING—continued.

surface from complete glabrousness to being fringed with hairs, pubescent or hoary. Though a bright green at first, they soon become dark, and wither to a dark or rusty brown. They give to Scotland the name of the "land of brown heath" and afford food and concealment to the mountain hare and to various species of grouse. To encourage the young growth, the Highland grouse-moors are now systematically burned by rotation of areas every ten or fifteen years; but an Act of Parliament of the reign of William and Mary forbade this burning of *Grigg*, as it was called, between Candlemas and Midsummer, under pain of whipping and imprisonment.

From June in the south to August in the north the flowers open, each little short-stalked bell having two leafy and two more membranous bracts below the rose, lilac, or rarely white calyx. The deep division of the four acute sepals, and of the shorter corolla within, renders the copious honey much more easily accessible than it is in the bell-shaped flowers of the true Heaths; and the perfume attracts a multitude of bees and other insects. It is accordingly the custom in the north to take bee-hives up on to the moors to secure the fragrant heather honey. The eight stamens are united by their anthers in a ring round the style, the anther-pores being on the sides of the anther-lobes where they are in contact. The awns projecting almost at right angles are hairy, serving thus, perhaps, to retain the honey; whilst the proboscis of the insect hovering below the flower on touching one of these sixteen minute radiating levers will break the ring of anthers and liberate the powdery pollen, which is carried by wind as well as by insects.

Although the precise determining causes are not ascertained, Ling seldom occurs on calcareous soil. Always social, and far more abundant than the *Ericæ*, in the poor sandy or gravelly soils of the lowlands it occurs with Birch and Bracken beyond the shade of the Oak in the Oak-birch heath association or *Quercetum ericetosum* of the ecologists, Birch, Scots Fir, and Aspen being almost the only seedling trees that can hold their own amid its roots and shade. On the thin, dry peat and pure sand of the Bagshot area the Ling is as strikingly dominant as on the moors of the north, mixed with *Erica cinerea* in drier, and *E. Tetralix* in moister, heaths. It is, however, in the Scottish Highlands, though with a sparing admixture of other species, such as Club-mosses, Mountain Ash, Bracken, and Pyrola, that the dominance of *Calluna* is most strikingly seen. There, when the rays of the rising August sun fell on the mountain,

"as each heathy top they kiss'd,
It gleam'd a purple amethyst."

CCV.—HEATHS.

Erica cinerea Linné and *E. Tetralix* Linné.

THERE are some striking contrasts between the closely related genera *Calluna* and *Erica*. The former genus is practically monotypic, none of the variations of *Calluna vulgaris* in such characters as pubescence being apparently sufficient to rank as species. *Erica*, on the other hand, numbers upwards of four hundred species. *Calluna* again is essentially and exclusively northern, being confined to Europe, exclusive of Turkey and Greece, the north-west of Asia, the Azores, Greenland, and small areas from Newfoundland to Massachusetts, being the only representative of the Sub-Family *Ericoideæ* in North America, and is thus appropriately known as *Ling*, a name derived from the Scandinavian languages. *Erica*, on the other hand, besides twelve species in Europe, some of which extend into northern Asia, North Africa, Abyssinia, and British East Africa, has numerous representatives in the rich and mainly xerophytic flora of South Africa. Of the six species wild in the British Isles, four are confined to the extreme south-west, the large-flowered and beautiful *E. ciliaris* Linné occurring in Dorset and Cornwall, the Cornish Heath (*E. vagans* Linné) in the west of Cornwall, the Mediterranean Heath (*E. mediterranea* Linné) in Mayo and Galway, and Mackay's Heath (*E. Mackayi* Hooker) in Connemara (Galway) only. On the continent of Europe these four species occur only in the west, in western France, Spain, and Portugal; while the two species represented on our Plate, which are widely dispersed over the whole of the British Isles, are also essentially western, *E. cinerea* extending only to northern Italy and Germany and *E. Tetralix* as far east as Poland. Sir Joseph Hooker accordingly suggested

"the probability of the South African flora being represented all along the highlands of eastern Africa, from Natal to Abyssinia; and further, seeing that most of the South African plants found in the Cameroons are also natives of Abyssinia, it would appear probable that the migration of these to the Cameroons was by and through Abyssinia."

Obviously the so-called Atlantic or Lusitanian florula or subordinate geographical group in our own flora, of which *Arbutus* and the above-mentioned Heaths are most prominent representatives, may well have extended northward along the same route. Our European Heaths do not extend into the Arctic regions, though *Ling* does grow in Iceland.

The genus *Erica* is said to take its name, Dioscorides's Greek *Ἐρείκη*, *Ereike*, from *ἐρείκω*, *ereiko*, I break, apparently because, growing as it does amidst finely broken sand, it was supposed, like the Saxifrages, to be useful in cases of calculus. Beyond the making of brooms and thatch, and some slight use in peasant industries for dyeing, the group is not now put to much use by man, but is valued chiefly for its beauty. The woody rhizome of *E. scoparia* Linné, the *Bruyère* of the French, is, however, the material of "briar" pipes.

We are yet far from a complete knowledge of the relations between soil-bacteria and Flowering Plants; but the species of *Erica* share in general the dislike



HEATHS—continued.

of calcareous soil evinced by *Calluna* ; and, though often flourishing in very poor sand, in most exposed upland situations, prefer a peaty soil. The decay of their fallen leaves adds indeed the black humus to the sands, which are often deprived of their iron by the humus-acids generated by these plants, and so converted from ochreous into grey and silver sands, the dissolved iron accumulating below in the moorband ironstone "pan," which often retains the acidity of forest and moorland swamps. The Cross-leaved Heath (*E. Tetralix* Linné) is characteristic of wetter situations than the Fine-leaved *E. cinerea* Linné, often sharing an acid bog with Sundew, Bog Asphodel, and Cotton-grass ; but all species apparently depend for their supply of water and nitrogenous food upon the association of their roots with a mass of thread-like fungus or "mycorhiza," which in this case is "endotrophic," actually penetrating the roots with which it is symbiotically associated. It has been experimentally demonstrated that this association is beneficial to the Heaths.

The leaves are whorled, minute, narrow, inrolled, and rigid, those of *E. cinerea* in whorls of three and glabrous, those of *E. Tetralix* in whorls of four, from which it takes its names, and fringed with long and often glandular hairs. The latter species is generally very pubescent. The presence of short, leafy, axillary shoots often misleads the tyro as to the number and arrangement of the leaves.

The flowers of most species are bell- or barrel-shaped and pendulous, the stigma projecting at the mouth of the corolla, so as to be first touched by the bees, the chief insects which come for the copious honey. This is secreted by a hypogynous disk. There are two or three bracts upon the short pedicels, and the whole genus exhibits the general reduction of the number of parts in the floral whorls to four. The dead corolla, fading to blue, to grey, and then to drab, persists into winter ; and one of the most impressive passages in Mr. Hardy's "Return of the Native" describes the "worn whisper, dry and papery," like "the ruins of human song which remain to the throat of four-score and ten," made by the November winds on Egdon Heath in these "mummified heath-bells . . . washed colourless by Michaelmas rains and dried to dead skins by October suns." While the crimson flowers of the more abundant *E. cinerea* are borne in a long dense raceme of whorls, the larger delicately blushing bells of *E. Tetralix* are collected in a terminal umbel ; and while the narrower-mouthed flowers of *E. ciliaris*, *E. vagans*, and *E. mediterranea* have no awns to their anthers, the two wider-mouthed species here represented both have them. The eight radiating awns in *E. cinerea* are toothed along one side ; but those of *E. Tetralix* are merely subulate. The pubescence so general in *E. Tetralix* extends to its ovary, while that of *E. cinerea* is glabrous. Throughout the genus the capsular fruit bursts loculicidally and septifragally, so that each of the four valves carries away a median septum. Both these species occasionally occur with white flowers.

CCVI.—ANALYTICAL DRAWINGS OF THE CORNEL FAMILY AND THE HEATH ORDER.

(*Cornaceæ* and *Ericales*.)

THE first of the eight plants analysed on this Plate is more nearly allied to those figured on Plate CXCVIII than to those with which it appears here, the Family *Cornaceæ* belonging, like the *Araliaceæ*, to the Order *Umbellifloræ*, and differing both from the *Umbellifloræ* and from most of the *Ericaceæ* in being represented by woody shrubs of some size. The flowers are biologically like those of the *Umbellifloræ*; but are homogamous. Though presenting considerable resemblance to those of such *Caprifoliaceæ* as the Laurestinus (*Viburnum Tinus* Linné), they differ in being polypetalous. Their tetramerous symmetry is generally carried out by the presence of only two carpels; but Mrs. Perrin's dissection of a Dogwood berry represents an exceptional case with three. Fig. 1 is a flower slightly enlarged, the four reflexed petals concealing the minute sepals; Fig. 2 is the same in longitudinal section; Fig. 3, a gynæceum, natural size; Fig. 4, the same rather later; Fig. 5, a much enlarged representation of this part of the flower, showing the honey-glands; and Fig. 6, an enlarged transverse section of the drupaceous but three-chambered fruit with stony endocarps.

A glance at the seven other rows of figures on the Plate shows the strong family resemblances between the flowers and fruits of the various genera in the Order *Ericales*. None of the Rhododendrons appearing here, we are impressed by the generally small urceolate corollas: the anther-chambers invariably dehisce by pores and are very often awned; while the flower symmetry—best shown in the transverse sections of the fruits—may be pentamerous or tetramerous.

The Family *Pyrolaceæ*, it must be admitted, is separated by but slight characters from the *Ericaceæ*. The first figure in the second line is a flower of *Pyrola media* Swartz, natural size. Fig. 2 is an enlarged view of the same, with the corolla removed; Fig. 3, a stamen, showing the two terminal pores and the absence of awns; Fig. 4, a gynæceum, natural size; Fig. 5, the same enlarged; Fig. 6, the same in transverse section, showing the five carpels and the large central placentas; Fig. 7, a ripe, loculicidally dehiscent fruit, enlarged; and Fig. 8, one of the characteristically elongated seeds with a loose testa.

The third line represents *Andromeda Polifolia* Linné, Fig. 1 showing a flower, natural size; Fig. 2, the same enlarged in longitudinal section, with the stamens detached from the style in cutting the section; Fig. 3, the eight stamens adherent to the displayed corolla; Fig. 4, a single stamen enlarged, showing the subulate hairy filament, suspended anther, sub-terminal pores, and ascending awns which are, however, often crossed over one another; Fig. 5, pedicel, calyx, and gynæceum, natural size; Fig. 6, gynæceum, isolated; and Fig. 7, an enlarged transverse section through the ovary, showing its five chambers and central placentation.



ANALYTICAL DRAWINGS OF THE CORNEL FAMILY AND THE HEATH ORDER—continued.

The fourth line represents the nearly-related Strawberry-tree (*Arbutus Unedo* Linné). Fig. 1 is a flower, natural size and drooping, as in nature. Fig. 2 shows two of the eight stamens and the gynæceum in the earlier position, when the hairy filaments have an outward bend, the anthers are inverted, with their closed pores and awns downwards, and their bases attached to the style by the little viscid pivoting point. Fig. 3 represents the later stage after the filaments have bent inwards, inverting the anthers till their pores press against the style, while the pivoting points have disappeared from their bases. Fig. 4 is a single mature stamen, very similar to that of *Andromeda*; and Fig. 5 is a section, natural size, through the yellow pulp of the superior, red, five-chambered berry.

The fifth line deals with the Whortleberry (*Vaccinium Myrtillus* Linné), Fig. 1 being a flower, natural size; Fig. 2, the same enlarged, in longitudinal section, showing the inferior ovary, disk, and epigynous corolla and stamens; Fig. 3, the gynæceum, natural size; Fig. 4, the same, enlarged, with the stamens; Fig. 5, the same, still further enlarged, to show the insertion of the stamens and the pressing of the long tubes of the anther-chambers against the style; Fig. 6, a stamen, enlarged; and Fig. 7, a section, also enlarged, across the five-chambered berry.

In the three remaining rows of figures, the flowers are all enlarged and are represented, as are the dissections of the previous rows, in an erect position, not pendulous, as in nature. The sixth line represents the Ling (*Calluna vulgaris* Hull), Fig. 1 being a flower, showing three of the four bracts, the long coloured sepals, the short corolla, and exserted stamens and style; Fig. 2 indicates the relative positions of the essential organs when the floral envelopes are removed; Fig. 3 is a single stamen, showing the long sub-terminal pore and the hairy awns; and Fig. 4, the lobed ovary, with the style and stigma.

The penultimate line deals with *Erica cinerea* Linné, Fig. 1 being the whole flower; Fig. 2, the essential organs; Fig. 3, the gynæceum; Fig. 4, a stamen; Fig. 5, the calyx, with bracteoles; Fig. 6, an enlarged sepal and bracteole; and Fig. 7, a transverse section through the four-chambered ovary, showing the placentas radiating from the centre. Unfortunately Figs. 2 and 4 are not quite large enough to show the serration of the awns of the anthers.

The last line represents the closely allied species *Erica Tetralix* Linné, the Cross-leaved Heath, Fig. 1 being the whole flower; Fig. 2, a sepal, showing the long glandular hairs; Fig. 3, the essential organs; Fig. 4, a stamen, the awns of which are not toothed; and Fig. 5, the gynæceum.

CCVII.—THE COWSLIP.

Primula veris Linné.

THE Order *Primulales* has usually polysymmetric, pentamerous, perfect flowers with epipetalous stamens and a one-chambered ovary with basal or free-central placentation. The number of parts in each floral whorl is not always five, the flowers are sometimes unisexual, and very frequently there is only one whorl of stamens and they are opposite to, instead of alternating with, the petals. The Order includes two Families with British representatives, the *Primulaceæ* and the *Plumbaginaceæ*.

The *Primulaceæ* are a Family of herbaceous plants well known for the great beauty of their copiously produced flowers, though of small economic importance. There are nearly thirty genera and four hundred species, nine genera and seventeen species being British. The group, though practically cosmopolitan, belongs mainly to the Temperate and Arctic regions of the Northern Hemisphere, many of the species being sub-alpine or alpine, reaching in various latitudes to the confines of perpetual snow. Most of them are low-growing perennials with simple, exstipulate leaves, bearing perfect flowers on *scapes*, or peduncles rising direct from an underground stem. The flowers are often relatively large, mostly secrete honey, and exhibit those bright and clear shades of colour so characteristic of mountain plants. The calyx is gamosepalous, persists in the fruit stage, and, except in the Brookweed (*Samolus*), is inferior; and the occasional presence of a whorl of staminodes explains the position of the stamens each in front of a petal. An outer whorl is clearly aborted or suppressed. It is, however, a remarkable fact that, in the early stages of the development of the flower, the petals originate later than, and as outgrowths from the outer sides of, the stamens.

Many members of the Family have dimorphically heterogonous flowers: different individuals, that is, produce flowers differing in the relative positions of the anthers and stigma—an arrangement which was shown by Darwin to be accompanied by marked physiological characters tending to secure cross-pollination. One plant will have a long style, so that the stigma stands at the mouth of the corolla-tube, while the anthers are inserted half-way down it: the other form will have a short style, so that the stigma is half-way down the tube, while the anthers are at its mouth. The Nottingham weavers, who are great amateur growers of Auriculas—a species of *Primula*—had long distinguished these two forms under the names “pin-eyed” and “thrum-eyed” respectively; but Darwin first showed that we have here an adaptation for cross-pollination by means of insects—whatever part of the insect touches the anthers in one form coming in contact with the stigma in the other—which is not only structural. If pollen-grains from the two forms lie side by side on the stigma of either, those from the anthers of the form differing in length of style from the pollinated flower will be “prepotent,” *i.e.* will be the first to germinate and so fertilise the ovules. Cross-pollination is thus physiologically safeguarded.



THE COWSLIP—continued.

The fruit of the Family is a capsule ; and the evidence of development, its splitting in some cases into five valves, and the occasional abnormal replacement of the gynæceum by five leaves, combine to prove that the globular ovary, undivided style, and rounded stigma represent five united carpels. Whether the free-central placenta is axial or carpellary in origin is a further subject for anatomical debate afforded by this interesting group of plants.

Pax, in monographing the Family for Engler and Prantl's "Natürliche Pflanzenfamilien," divides it into five Tribes, of which only the first four, with polysymmetric flowers, have British representatives, while the fourth—not represented among our Plates—comprises *Cyclamen* and *Dodecatheon*, the American Cowslip, with a reflexed corolla. The first two of his Tribes, *Primulæ* and *Samolæ*, agree in the æstivation of their corollas, which is that known technically as *quincuncial*, two petals having both edges outside, two with both inside, and the fifth with one overlapping and one underlapping. *Samolus*, the only genus in the *Samolæ*, differs from the *Primulæ* in having the calyx partly adherent to the ovary.

The genus *Primula* is distinguished by its tubular calyx, salver-shaped corolla, tubular below, with a more or less spreading limb, and five valves each splitting into two teeth in the ripe capsule. It includes upwards of 150 species ; and, though its headquarters would seem to be in western China—the home of such beautiful favourites as *P. sinensis* Sabine, *P. obconica* Hance, and *P. cockburniana* Hemsley—it is very widely dispersed, our lovely little northern Bird's-eye Primrose (*P. farinosa* Linné) being represented by a very slightly differing variety in the distant Falkland Islands. There are five British species, the two northern forms, *P. farinosa* Linné and *P. scotica* Hooker, having their leaves smooth and mealy beneath, and the calyx-tube not pleated into angular folds ; whilst the Cowslip, Primrose, and Oxlip—so closely related as to have been regarded by some botanists as a single species—have their leaves wrinkled and toothed but not mealy, and the calyx-tube strongly folded into five pleats, so as to present a five-pointed star-like outline if cut across.

The stem is a short, thick rhizome, dying away so as to leave a truncate or præmorse base, its short branches ending in rosettes of radical leaves and a terminal stalked umbel of flowers ; but, whilst in the Cowslip (*P. veris* Linné) and Oxlip (*P. elatior* Jacquin) the peduncle is long and the pedicels of the individual flowers are short, in the Primrose (*P. vulgaris* Hudson) the peduncle is so short that it, and the involucre of narrow pallid bracts which surmounts it, are hidden among the bases of the leaves, while the pink pedicels are nearly as long as the leaves. Thus when we gather Cowslips we pluck a whole umbel ; whilst when we are picking Primroses we take each flower separately.

CCVIII.—THE PRIMROSE.

Primula vulgaris Hudson.

PRIMULA, the little flower of spring, the early season, in Latin *primum tempus*, in French *printemps*, is as appropriate a name alike for Primrose and Cowslip as for the Daisy to which it seems to have been first applied. The Italian *for di primavera* became *primaverola*, in French *primeverole*, and in thirteenth and fourteenth century French and English alike *primerole*. A century later, the misunderstood *l* gave place to *s*, and Daisy or Privet became the *Primerose* or earliest Rose of the year. Matthiolus in 1586 uses the name both for Daisy and Cowslip; Parkinson in 1640 for Daisy and Primrose. The Primrose, generally in flower in sheltered nooks by Christmas, is, indeed, as Milton calls it, a “rathe” or early flower. In Guernsey the name takes the pretty form of *Pâquerolle*, little Easter roses, and a local proverb runs “I n’y a poui Noué sans se pâquerolle ou p’tit agné” : “There’s never a Christmas without its primrose or little lamb.” Coming in abundance when other flowers are yet scarce, when the first birds are singing, the first bees humming, and the first green leaves unfolding, it generally to-day brings with it suggestions of joy. When Perdita sings sadly of

“Pale Primroses
That die unmarried ere they can behold
Bold I hæbus in his strength,”

Shakespeare may have been mentally contrasting this flower, adapted mainly, perhaps, for pollination by night-flying moths, with his greater favourite, the more robust-seeming Cowslip. The Primrose, rejoicing in the rich humus of woods and flowering before the shade of the trees obstructs the sun, is the more generally distributed of the two species; but the Cowslip, a clay-loving plant, though often absent from the sandy loams of the Midland Trias, flourishes near at hand on the clays of the Lias, so that it was, no doubt, familiar to the poet’s childhood at Stratford. The “eye,” or centre, of the Primrose flower is, indeed, marked with darker colour remarkable for its actinism, which makes photographs of the flower, unless taken on isochromatic plates, develop a black centre; but these honey-guides are not so marked as the “cinque-spotted” “freckles,” “the crimson drops i’ the bottom of a Cowslip,” which seem so to have captivated the poet’s fancy. Of Titania, the Fairy Queen, he writes :

“The Cowslips tall her pensioners be;
In their gold coats spots you see;
Those be rubies, fairy favours,
In those freckles live their savours.”

We cannot certainly locate the delicious perfume of the Cowslip as the poet does; but how it suggests the rich pastures in the fresh air of spring! How distinct too are the perfumes of the three related species that Linnæus and Bentham would treat as mere varieties! The Primrose gives a faint woodland scent, suggestive of the pale tint of the blossom, but, like that of other plants visited by the insects of



THE PRIMROSE—continued.

dusk and darkness, stronger in the evening and very sweet when obtained from a whole bunch of flowers. The creamy-yellow Oxlip (*Primula elatior* Jacquin), confined in Britain to a limited area round Saffron Walden, has a stronger, Apricot-like perfume ; but the Cowslip, deepest in colour, is also strongest in its fragrance.

Few popular names are more obscure in their etymology than *Cowslip* ; but we may, therefore, be content to leave etymology alone and rejoice in the pleasant associations to which the name, as we have it, gives rise. There is indeed but little poetry in some of the earlier names we have for these plants. They were classed as *Verbascula* or *Petty Mulleins*, and Turner, in 1548, writes of them :—

* “The fyrste is called in barbarus latin Arthritica, and in englishe a Primerose. The second is called in barbarus latin Paralysis, and in englishe a Cowslip, or a Cowslap, or a Pagle.”

Arthritica, corrupted into *Artetyke*, and *Herb Paralysis* or *Palsywort*, though they occur in “The Grete Herball” of 1526 and in Gerard, are probably now extinct ; and the increased ease of locomotion and the reading of books about plants tend nowadays to substitute general names for the old local ones. The many pretty names that compared the umbel of the Cowslip to a bunch of keys barely linger. *St. Peterwort*, probably based on this comparison, is no longer known ; but *Lady Keys* remains near Folkestone and *Culverkeys* and *Culverkey-wine* near by, at Ashford ; while prettier than either is the German *Himmelschlüsselchen*, little keys of heaven. The obscure *Paigle* is still in common use in the south-eastern counties ; and though we might like to connect it, as Dr. Prior does, with the German *Spiegel*, a mirror, from the children’s favourite test as to whether one “loves butter,” Professor Skeat’s note, quoted by Messrs. Britten and Holland, seems more convincing :—

“French *paillole*,” he writes, “Italian *pagniola*, mean a spangle or small piece of gold. The root of this word is Fr. *paille*, Ital. *pagliuola*, straw, chaff ; and the spangles were named from their minuteness, resembling pieces of chaff. This derivation would make out *paigle* to mean a spangle.”

It is strange that there are not nearly as many popular names for the Primrose as for the Cowslip, nor has the former species, perhaps, ever inspired such real poetry as the latter. Though imbued neither with fancy nor imagination, the sonnet by John Clare, of which the following lines form a part, is at least a piece of photographic nature-study :—

“Welcome, pale primrose ! starting up between
Dead matted leaves of ash and oak that strew
The every lawn, the wood, and spinney through.
'Mid creeping moss and ivy's darker green ;
How much thy presence beautifies the ground !
How sweet the modest unaffected pride
Glowes on the sunny bank and wood's warm side.”

At present the Primrose’s beauty recedes in ever-widening circles from the woods in the neighbourhood of our larger towns. Degraded to the position of a badge in party politics, or transplanted wholesale to linger in suburban gardens, prolific though it is, it is actually in danger of local, if not of general, extermination.

CCIX.—THE WATER VIOLET.

Hottonia palustris Linné.

AS we have previously had occasion to remark, aquatic Flowering Plants are, in most if not in all cases, descended from a terrestrial ancestry. Although there are genera and Families and even a few Orders made up entirely of aquatics, they are very often isolated genera or species whose nearest living relatives are land plants. This is, of course, the case with the Water Violet (*Hottonia palustris* Linné). In speaking of the Order to which it belongs we said that its members had in general simple, undivided leaves. The Water Violets, however, are in this respect exceptional : specially adapted to their surroundings, they have the finely divided leaves so general among submerged aquatic plants. Another vegetative character which they share with plants adapted to similar surroundings rather than with their near kin, is the formation of winter-buds or hibernacula which sink to the bottom during winter. On the other hand, the flower-stalk rising above water, and bearing flowers fitted for insect-pollination, is a clear indication of their terrestrial affinities.

This small genus includes only two known species, one North American and the other our species, which ranges from western Siberia through Central Europe, not occurring in Turkey, Greece, Spain, or Portugal. Their generic name was given by the great Leyden physician Boerhaave (1668–1738) in honour of Peter Hotton, Professor of Botany there down to 1709. Both of them are floating herbaceous plants, with whorls of submerged leaves divided pinnately into many close-set, thread-like segments. The flowers are of a considerable size and are borne on a raceme of umbels, much like the inflorescence of *Primula japonica* Asa Gray, now familiar in our gardens. They vary in colour from white to pink or lilac, much as do those of the Lady's Smock (*Cardamine pratensis* Linné), secrete honey, and are dimorphic, like those of the Primroses. Cleistogene flowers are also occasionally produced. The calyx is divided into five almost to its base : the corolla is salver-shaped with a thickened throat and notched petals ; and the stamens are included within the corolla-tube. Sepals, petals, and stamens are occasionally six, seven, or eight, instead of five, in number. The ovary is globose and the style persists in the fruit stage, the capsule splitting into five valves which remain coherent both above and below.

Our species (*Hottonia palustris* Linné) is generally distributed, though of somewhat local occurrence, throughout England and has been found in Ireland, but not in Scotland. It is a pale green, perennial plant, with a glabrous surface, with the exception of the pedicels and the peduncle in the neighbourhood of the flowers which are covered with glandular hairs. These serve probably, like those of *Saxifraga tridactylites* Linné, or the Catchflies (*Silene* and *Lychnis*), to keep off the small crawling insects that might steal the honey without pollinating the flower ; but it would be interesting to ascertain whether such insects may in this case be digested or otherwise



THE WATER VIOLET—continued.

serve as food to the plant. Growing in shallow, clear ponds, ditches, and marshy places, generally on a gravelly soil, the plant has a creeping root and sends out from the base of the scape radiating, floating, succulent branches, six inches to a foot in length and about as stout as a goose-quill. These branches send down at intervals long silvery roots into the water and bear the whorls of leaves ; and it is their terminal buds, crowded with thickened leaves, that form the winter-buds. The pectinate or comb-like leaves are from one to four inches long and the cylindrical scapes may rise a foot or more out of the water. The whorls consist of from four to eight flowers each and have linear bracts ; and the pedicels, which may be an inch or more in length, take an ascending direction during flowering, but become deflexed after fertilisation. The sepals are linear, sub-acute, and about as long as the tube of the corolla, *i.e.* about a third of an inch in length ; whilst the white or lilac limb of the corolla has a yellow eye and rounded, notched petals, and is about three-quarters of an inch across. The short, subulate filaments are, as in *Primula*, opposite to the petals ; and, also as in the nearly related genus, the ovary is globose and the style and stigma are undivided. The numerous seeds are somewhat angular and cover the relatively large, globose, free-central placenta.

It has been observed that tiny drops of clear liquid exude from the upper part of the ovary and, to a less extent, from its sides and from the style. This may be the nectar, or it may be the exudation of some of the excess of water in the transpiration current.

Most of the earlier botanists combined this distinctively pretty plant with various other aquatic plants with finely-cut leaves, such as *Myriophyllum*, *Utricularia*, and the Batrachian *Ranunculi*, under the general name of *Water Milfoil*. Recognising some likeness in the flower to the Cruciferous Stocks or Gilliflowers (*Matthiola*), Lyte called it *Water Gilliflower* ; and, as the name Violet was also applied to the Stocks, *Hottonia* acquired the name *Water Violet* by which it is now most generally known. Gerard, in 1597, writes of it that it has

“small white flowers like unto stocke Gilloflowers . . . is called in Dutch *Water Violieren*, that is to saie, *Viola aquatilis* : in English water Gilloflower, or water Violet : in French *Gyreffes d'eau* . . . I have not founde such plentie of it in any one place as in the water ditches adjoining to Saint George his fielde neere London.”

William Curtis, two hundred years later, in his “*Flora Londinensis*,” says that it “abounds in most of our watery ditches near London.” Though not now to be found in the neighbourhood of St. George’s Cathedral, Southwark, it is still fortunately not uncommon in the home counties, its delicate tints beautifying many a humble pool in May and June.

It is now known in Germany as *Wasser-viole*, and in France as *Plume d’eau* or *Millefeuille aquatique* ; whilst *Featherfoil*, used by Sir J. E. Smith, is said to be still current in Cumberland and *Water Yarrow* in Yorkshire.

CCX.—THE WOOD LOOSESTRIFE.

Lysimachia nemorum Linné.

THE Tribe *Lysimachieæ*, as understood by Pax, is mainly characterised by the convolute æstivation of the corolla, each petal having one edge overlapping and the other overlapped. It includes five British genera :—*Lysimachia*, *Trientalis*, and *Glaux*, with capsules dehiscing by valves, and *Anagallis* and *Centunculus* in which they split transversely. All five agree in having cauline leaves and a superior ovary.

The genus *Lysimachia* comprises some sixty species, natives of Temperate and Sub-tropical regions and mostly northern. Four species are British. The name *Λυσιμαχία*, *Lusimachia*, was used by Dioscorides and seems to have been originally given in honour of Lysimachus, King of Thrace, who was, as Gerard puts it, “the first finder out of the nature and vertues of this herbe.” A fancy portrait of Lysimachus appears, with others, on the title-page of the Flemish, French, and English editions of Dodoens’s “Herbal.” What the herb was, is not at all clear, since the Purple Loosestrife (*Lythrum Salicaria* Linné), and, perhaps, the Epilobiums, seem to have been included under the name. By the time of Pliny, however, the notion had arisen that the name was derived direct from *λύσις*, *lusi*s, loosing, and *μάχη*, *mache*, strife, and accordingly Pliny supplies the explanation—to quote Gerard once more—

“of a speciall vertue that it hath in appeasing the strife and unrulinesse which falleth out among oxen at the plough, if it be put about their yokes.”

The confusion is perpetuated by later writers. Turner, in his “Names of Herbes,” writes :—

“*Lysimachia* is of two sortes. The one is described of Dioscorides, and it hath a yealowe floure. Some cal it *Lysimachiam luteam*, it groweth by the Temes syde beside Shene, it may be called in englishe yealow Lousstryfe or herbe Wylowe. The other kynde is described of Plinie, and it is called *Lysimachia purpurea*, it groweth by water sydes, also and maye be called in englishe red loostryfe, or purple loestryfe.”

Lyte calls the former of these two plants, which is, of course, our largest species, *Lysimachia vulgaris* Linné, *Golden Loosestrife* and *Golden or Yellow Willow Herb*; and Gerard uses *Willow Herb* without qualification.

While that species and the rare *Lysimachia thyrsiflora* Linné grow erect to the height of several feet, other species, such as the one here represented and the Moneywort or Creeping Jenny (*L. Nummularia* Linné), are small prostrate plants; but they are perennial. The leaves throughout the genus are cauline, simple, and entire, and the flowers nearly always yellow, as they are in all our British forms, and destitute of both honey and odour. The calyx is persistent and has five, or very rarely six, deeply divided spreading lobes: the corolla is rotate, though in *L. Nummularia* Linné it may rather be termed funnel-shaped; and the single whorl of stamens, opposite to the petals, are generally distinguished from those of *Anagallis* by having smooth filaments. The style persists as a point to the capsule; and the



THE WOOD LOOSESTRIFE—continued.

latter dehisces generally into five or ten teeth. The numerous angular seeds cover the large free-central placenta as in other genera of the Family.

Lysimachia nemorum Linné is appropriately named, for *nemus* means a dark or shady wood, and this species is singularly tolerant of dense shade. Such shade, of course, will often secure for it the lasting moisture which it specially requires. We have often found it flourishing during the driest of summers in some spot of humus still remaining moist, lighting up the dimmest recesses of a wood with its golden star-like blossoms. Pena and Lobel, the first botanists to record it as a British species, well express its habitat when they write of it in 1570 in their "Adversaria," or Note-book, as

"Anagallis lutea . . . In Angliæ nemoribus locisque opacis,"
"Yellow Pimpernell, in groves and shady places in England,"

adding that they found it

"in quadam densa et amœna sylva Coventriæ proxima,"
"in a certain thick and pleasant wood near Coventry."

Its square trailing stems, opposite pairs of ovate leaves, and regularly pentamerous blossoms resemble so strikingly the general habit of the commonest of our Pimpernels, the scarlet *Anagallis arvensis*, that it is not surprising that from an early date it should thus have been classed with them under this name *Anagallis lutea* and its English equivalent *Yellow Pimpernel*. Though the filaments of its stamens are glabrous, those of its congener the Moneywort are covered with white glandular hairs. The main difference, indeed, separating this species from those of the genus *Anagallis* is the transverse dehiscence of the capsules of the latter.

The smooth, square, sinuous stems of *Lysimachia nemorum* are a beautiful pellucid red: the little pointed sub-sessile leaves are slightly fleshy and of a bright shining green, larger than those of the Scarlet Pimpernel; and the flowers, which are from half to three-quarters of an inch across, are borne solitarily on slender, gracefully curving, axillary stalks. The sepals are narrow and subulate, and the petals are fringed with short glandular hairs. The filaments are very slender and glabrous; and the capsule is small and globular. The latter may not split at all, or may divide lengthwise in two valves, or into ten very narrow ones connected in pairs.

The whole plant is so graceful in form, so pleasing in its bright colouring, that it is not surprising that it is recommended for cultivation. There is no difficulty in growing it; and, though a much smaller plant in all respects than its near ally the favourite Moneywort (*L. Nummularia* Linné), it possesses several distinct and beautiful features of its own. Its season of flowering is from May to July. In distribution it is typically Central Europæan, not occurring in Greece, Turkey, Russia, or northern Scandinavia.

CCXI.—THE PIMPERNELS.

Anagallis tenella Lightfoot, *A. cærulea* Schreber, and *A. arvensis* Linné.

TO appreciate to the full the manifold beauties of Nature we must vary our focus of vision. As he who would cultivate a catholic taste in art admires at one time the broad masses of colour on the spacious canvas that requires a gallery for its exhibition, and may then turn with equal pleasure to the miniature painting of the Dutch school; so, while our eyes are at one moment charmed with the landscape effect of some fine tree, or of wide surfaces gay with some flower which may or may not possess much beauty of individual form, at the next moment we may delight in the delicate tracery and tinting of a single tiny weed, a spot of grace and colour upon the ground.

And assuredly there are few more beautiful little plants than the Pimpernels. The popular name would justify our inclusion of the subject of the last Plate in this dainty group; but, charming as it is, the genus *Anagallis* requires no addition to its list of beauties. Of twelve species in all, eight are European and three are British; but their copious seed-production, efficient dispersal-mechanism, and small requirements as to space and soil, have secured for the group a wide area of extension in all four quarters of the globe. No one disputes the nativity of that lovely little denizen of our bogs, *Anagallis tenella*; but our two other species are mainly cornfield weeds and as such are subject to the suspicion of an alien origin, apart altogether from the tint of their blossoms, so unusual among British plants.

Mr. Dunn in his "Alien Flora of Britain" writes:—

"*Anagallis arvensis*, L. A widely spread weed of roadsides, cultivated and waste places. It is native on sand-dunes in England, as well as in Southern and Western Europe. It is not often recorded in England from natural habitats, and may be confined as a native to the south-western counties. On the other hand, it may perhaps have a wider indigenous distribution, as such a common plant would often be overlooked in unusual habitats. With regard to the variety *cærulea*, the plant recorded under this name by British botanists is the blue-flowered form of the Pimpernel, differing from the type in no other respect than colour. It is a common cornfield weed in Europe, and frequently reaches this country as a grain introduction."

We are not convinced of the soundness of several of these conclusions. The Scarlet Pimpernel, so well established on our vacant sand-dunes, may, after all, have come from the cornfields, as it might spread itself to other unusual habitats; and we believe that in *Anagallis cærulea* Schreber we have a species altogether distinct from the blue variety of *A. arvensis* Linné.

Curiously enough, both the Latin and the common English names of these lovely little plants are of obscure origin. *Ἀναγallis*, *Anagallis*, used by Dioscorides, is said to denote that the plant excites pleasure; but its etymology is uncertain; while of *Pimpernel* Dr. Prior can only say that, as applied, with the variation *Pimpinell*, to the Salad Burnet (*Poterium Sanguisorba* Linné) and to the Umbelliferous Burnet Saxifrage (*Pimpinella Saxifraga* Linné), it comes from the mediæval *bipennella* and refers to bipinnate leaves; but that as applied to *Anagallis* it in no way agrees with that explanation. We would venture to suggest that here, as is often the case in



THE PIMPERNELS—continued.

etymology, two distinct words have become assimilated in their spelling ; that *Pimpinell* and *Pimpernel* are two such words ; and that the latter is connected with the Celtic *pimper*, the equivalent of the Greek πέμπε, *pempe*, Latin *quinque*, Gothic *fmf*, and our *five*, with reference to the striking symmetry of the blossoms.

We have already had occasion to mention some of the main botanical characters of the genus *Anagallis* as such, viz. the five sepals and funnel-shaped or rotate corolla, which distinguish it from *Centunculus*, the hairy filaments, and the transverse dehiscence of the capsule.

The Bog Pimpernel (*Anagallis tenella* Lightfoot) is a perennial with thread-like, four-sided, prostrate stems ; minute ovate leaves in opposite or sub-opposite pairs, lying in one plane ; and relatively enormous flowers. Their delicate little funnel-shaped corollas, about half an inch across, of the palest pink, but traversed by darker veins, stand erect : they are much longer than the calyx and are almost filled with the woolly hairs on the stamens.

The Blue Pimpernel (*A. cærulea* Schreber)—Mrs. Perrin's presentment of which hardly corresponds to our own slight acquaintance with this rare plant—is a sturdy, little, erect, annual plant, with black dots on the lower surface of its close-set ovate leaves, with no glandular hairs along the margins of its intensely blue petals, found on sunny chalk slopes facing south, and coming true to seed. It is said not to be capable of crossing with *A. arvensis*. A probable explanation of most of the conflict of opinion about this plant is that there are two, one a distinct species and the other merely a colour-variation of *A. arvensis*.

The Scarlet Pimpernel (*Anagallis arvensis* Linné) is an annual, generally prostrate, and branching freely from the base of its stem, so that it spreads out over a considerable area. The four-angled stem forms water-channels from the spaces between the leaves. The sessile ovate leaves are dotted with black glands beneath and the petals are bordered by a row of short stalked glands. The narrow sepals appear between the petals which they nearly equal in length. The corolla is generally a bright scarlet of a shade unique among British plants, with a violet eye ; but it may be pink, white with a red eye, pure white, or blue. Though honeyless and homogamous and probably often self-pollinated, it is visited by one of our smallest British bees. It only expands in sunny weather, and then only from about nine in the morning to three in the afternoon, closing temporarily for cloud or rain. The pollen is thus protected save when the special fertilising bee is abroad. Hence the many popular names that the plant has obtained, such as *Wink-a-peep*, *Shepherd's Clock*, *Shepherd's Sundial*, *Shepherd's Watch*, *Shepherd's Glass*, and *Poor Man's Weather-glass*.

CCXII.—THRIFT.

Statice Armeria Linné.

THE Family *Plumbaginaceæ* is a small group of ten or a dozen genera and less than three hundred species of perennial herbaceous or shrubby plants, cosmopolitan in distribution, but more especially characteristic of the sea-coast and saline steppes. Most of them have narrow, undivided, and often somewhat fleshy leaves ; a bracteolate inflorescence of polysymmetric, perfect, pentamerous flowers ; a persistent inferior calyx ; a deeply-divided, convolute corolla ; five epipetalous stamens opposite to the petals ; and a one-chambered ovary, with five styles and a single, basal, anatropous ovule, forming a dry indehiscent nut. The five styles and the single ovule are, it will be noticed, the main distinctions separating the Family from the *Primulaceæ*.

The Family takes its name from the genus *Plumbago*, which has been named Leadwort from the peculiar cool grey lead-blue of the flowers of several of its species, such as *P. capensis* Thunberg, a South African hedgerow climber which is a favourite in our greenhouses, and *P. Larpentæ* Lindley, a hardier Chinese form. There has been considerable doubt of late years as to the proper names of our two much differing British genera, the Thrifts and the Sea Lavenders, the name *Statice* having been applied to both of them, and the latter having been known under Philip Miller's name *Limonium* which, in fact, dates back to Matthiolum. Linné certainly took the Thrift as the type of his genus *Statice* ; and, therefore, we must employ Miller's *Limonium* for the Sea Lavenders.

The narrow rigid leaves and pink pentamerous flowers long associated the Thrifts with the Pinks, especially such species of *Dianthus* and *Silene* as have their flowers closely crowded together, under the name *Armeria*. A species in each of those genera still, in fact, retains *Armeria* as a specific name, whilst the Thrift is sometimes known as the *Sea Pink*, the *Cushion Pink*, or *Scawfell Pink*. Gerard says :

"The Sweet John, and also the Sweet William, are both comprehended under one title, that is to say *Armeria*, in French *armoires* ; hereupon Ruellius nameth it *Armerii flores*."

It is difficult, however, to trace any intelligible connection between these plants and *armoires*, *i.e.* wardrobes ; but a very plausible etymology is the Breton *ar mor*, the sea-shore.

The genus comprises some fifty species, mostly belonging to the North Temperate Zone, but some of them, including our own species, occurring in the Andes as far south as Chile. It is an interesting fact that closely-allied or identical forms occur in the unfavourable surroundings alike of the sea-shore and of bare mountain tops, though this diversity of habitat is accompanied by some differences in their chemical composition. Thrift as a maritime plant contains both iodine and soda ; but on mountains, as in our gardens, both these substances are replaced by potash.



THRIFT—continued.

The primary root is perennial, and the short shoot made each year dies down almost entirely, the next year's shoot arising as an axillary branch on the remnant. The leaves are all radical and very narrow ; and the inflorescence is a naked scape bearing a dense hemispherical head of shortly-stalked flowers in cincinni, *i.e.* unilateral cymes, surrounded by membranous bracts. The outer of these bracts are united and reflexed, forming a membranous sheath round the upper end of the peduncle. The calyx of each flower is membranous and inferior, but is prolonged upwards into a funnel-shaped limb, coloured at first and supported on five ribs. This in an enlarged withered condition serves as a sort of parachute to aid in the dispersal of the fruit by the wind. The deeply-separated petals also persist, and the tube formed by their bases is lined by hairs protecting the honey secreted at the bottom. The flowers, thus rendered conspicuous by being massed together, are sweet-scented, and are thus fully adapted to insect-pollination.

"When the flower opens," writes Lord Avebury, "the five stigmas are in the centre surrounded by the anthers, which are over the honey. Subsequently they change places, the stigmas moving outwards, the anthers approaching the centre of the flower. Finally the stigmas wind spirally, and touch the anthers."

Self-pollination would thus seem not to be prevented as a last resource.

The commonest variety, both on most of our coasts and on Scawfell and other lesser mountains, has very slender, one-veined leaves, slightly flattened on their upper surfaces. Another form, var. *planifolia* Syme, with broader blunt leaves, some of which have three veins, is characteristic of the Scottish mountains. The form represented on our Plate would seem to be a third, var. *duriuscula* Babington, characteristic of our southern shores, with very slender, slightly three-sided, one-veined leaves, channelled along their upper sides.

The maritime form of Thrift forms a special feature in the particular salt-marsh association, covered only by the higher tides, known to ecologists as the *Glycerietum maritimæ* from the dominant grass *Glyceria* (*Sclerochloa*) *maritima*, which forms a dense turf studded over in summer by the rose-pink and lavender blossoms of *Statice* and *Limonium*. It is the dense tufts of its grass-like leaves in such situations that have obtained for Thrift such names as *Sea Grass*, *Sea Turf*, and *Our Lady's Pincushion* (probably *Pink Cushion*). The name *Thrift* itself is, as Dr. Prior explains, the passive participle of the old verb to "threave," meaning "to press together," in other words the Clustered Pink, probably rather with reference to the crowded flowers than to the tufted leaves.

Thrift is a cottage-garden favourite as an edging for borders, and there are several fine garden varieties and allied species, with pink, crimson, and white flowers, which prefer well-drained sandy soil and are by no means difficult to cultivate.

CCXIII.—THE DWARF SEA LAVENDER.

Limonium humile Miller.

THE Sea Lavenders often grow side by side with the Thrift. Sharing the same unfavourable conditions so far as water-supply is concerned, though apparently rejoicing in the uninterrupted sunshine on the flat, wide-stretching salt-marshes, they exhibit similar xerophytic adaptations. Their leaves are often somewhat fleshy and glaucous, and their flowers share with the Bog Asphodel, with Rushes, and with a particular section of South African *Compositæ* the persistent membranous but often brightly-coloured perianth to which we give the name "everlasting." In the structure of the flower there is but little difference between the two groups, save that the styles in the Sea Lavenders are glabrous, whilst those of Thrift are hairy ; but the whole appearance of the two groups is so different that it may well cause surprise to learn that Linnæus classed them together in the one genus *Statice*. The explanation, however, is that the striking difference between the two groups is the character of the inflorescence, whilst it was a cardinal principle with the great Swedish botanist and his more precise followers that generic characters were to be based exclusively on the flower, neither habit, vegetative characters, nor even the branching of the inflorescence being considered. The gradual adoption of a Natural System of classification, however, modified the views of botanists, not only as to classes, but also as to genera and species ; and the earliest change made was the separation of the Thrifts under the name *Armeria*. As, however, the Thrift had been taken by Linné as the type of his genus *Statice*, we are bound, as we have seen, to retain *Statice* as the name for Thrift and take the next earliest generic name for the Sea Lavenders, which is *Limonium*. *Λειμώνιον*, *Leimonion*, meaning "belonging to moist meadows," is used by Dioscorides ; but Philip Miller, in the eighth edition of his "Gardener's Dictionary," published in 1768, is the first post-Linnæan writer to employ it, and he there uses *Limonium humile* as a name for the subject of our Plate. This plant was described as *Statice bahusiensis* by Fries in 1839, and was, not quite accurately, identified by Babington in 1843 as the species described as *S. rariflora* by Drejer in 1838 ; and it, therefore, appears under one or other of these names in many of our Floras.

Limonium comprises some 130 species, distributed over most parts of the world and occurring on saline steppes as well as on salt-marshes, but especially abundant in western Asia. They are perennial herbaceous plants, with all their leaves radical, and with their flowers grouped in a mixed inflorescence which is technically known as a compound raceme of drepania. Its primary and secondary branches succeed one another acropetally, but the ultimate pedicels or flower-bearing twigs form unilateral cymes. These are of a different type from those in the crowded heads of the Thrift, each successive branch being on the same side of the first flowering axis and in one plane with it. This is termed a *drepanium*, the "sichel" of German botanists,



THE DWARF SEA LAVENDER—continued.

and results in a flat row of flowers with their bracts in reversed order all on the outside or end of the row. These bracts are often brightly coloured.

Six species of *Limonium* are now recognised as British, all coast plants, though two (*L. binervosum* C. E. Salmon and *L. recurvum* C. E. Salmon) frequent more rocky shores than do the others. The Common Sea Lavender (*L. vulgare* Miller) and *L. humile* Miller often occur together, as they do on the mud-banks of the Yar near Freshwater, where Mrs. Perrin's example was collected. Both species have stalked, pointed leaves, with one prominent midrib and pinnate secondary veins : both have from one to three flowers in each ultimate cymose cluster ; and in both there are teeth between the lobes of the calyx. *Limonium vulgare* is corymbose, its flowering branches rise to one level, its cymes are densely grouped together and are often recurved, and the outer bracts are rounded at the back ; whilst *L. humile* differs in each of these points, not being corymbose, having its cymes lax and erect or incurved, rather than recurved, and the outer bracts keeled.

It is pleasant to trace the workings of an acute mind ; and it was while examining the Sea Lavenders in the herbarium of Samuel Dale, the friend and executor of Ray, that the present writer first recognised the great critical acumen of that botanist. In several instances specimens of what we now recognise as "critical" forms were placed in separate sheets of paper, even though the collector was unable to hazard a name ; while at other times elaborate labels bore witness to the most careful scrutiny of all available synonymy. Dale it was who, in 1700, first recognised *Limonium humile* as a British plant.

"I found this," he writes, "on the sea banks of the tide mill at Walton, in 1700, and in August 1722 I afterwards observed the same, only larger, on the sea banks on the left hand of the road from Heybridge to Maldon."

The discovery was first recorded, as "*Limonium Anglicum minus, caulibus ramosioribus, floribus in spicis rarius sitis*," in the third volume of Ray's "*Historia Plantarum*" in 1704 ; and the plant is still growing in the neighbourhood of both these localities.

CCXIV.—ANALYTICAL DRAWINGS OF THE PRIMROSE ORDER.

(*Primulales*.)

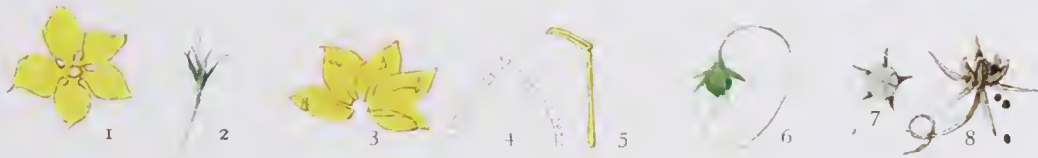
DIFFERING much in size, colour, and general form, the plants analysed in the first six rows of figures on this Plate are all closely related in most fundamentals of anatomy, so that there can be no question as to their belonging to one Family ; while those represented in the two remaining rows of figures, though still more closely allied to one another, can be recognised as not remotely connected with the rest. As in the Order *Ericales* we saw in the porous dehiscence of the anthers a link uniting all the examples, so here the pentamerous flower with a single stamen in front of each petal is a character common to all. The most obvious distinction separating the Family *Primulaceæ*—the first six rows of figures—from the *Plumbaginaceæ*—the last two rows—is the single style in the former and the five distinct styles in the latter group.

The first six rows only represent four genera, the first two being devoted to *Primula* and the fifth and sixth to *Anagallis*.

In the first line, the Cowslip (*Primula veris* Linné), Fig. 1 is a single flower, apparently of the short-styled form, seen laterally, and of natural size ; Fig. 2, the same seen from above ; and Fig. 3, the same with half the calyx removed, showing the space between the calyx and corolla which serves as a protection for the honey in the corolla-tube against boring insects. Fig. 4, a longitudinal section of the corolla, shows the relative position in this form of the stigma—half-way down the corolla-tube—and of the anthers near its mouth, the orange spots being honey-guides ; and Fig. 5, an enlarged longitudinal section of the ovary, shows the ovules attached to the globose free-central placenta.

The second line of figures illustrates both forms of the Primrose (*Primula vulgaris* Hudson). Fig. 1 is a flower of the long-styled or pin-eyed form, seen from above ; Fig. 2, the corolla of the same, seen laterally ; Fig. 3, the calyx ; Fig. 4, a longitudinal section of the same, showing the epipetalous anthers half-way down the corolla-tube and the stigma at its mouth ; Fig. 5, a similar section through a short-styled flower, showing the relative positions of anthers and stigma reversed ; Fig. 6, a stamen ; Fig. 7, the gynæceum ; and Fig. 8, the placenta, covered with ovules. These eight figures are of natural size. Fig. 9 is a capsule bearing withered remains of the flower, enlarged ; and Fig. 10 is a view of the colourless placenta and green ovules removed from it.

The third line of figures illustrates the Water Violet (*Hottonia palustris* Linné), Fig. 1 showing a petal, enlarged, with the superposed stamen in front of it ; Fig. 2, a longitudinal section to show the form of the corolla-tube and the insertion of the stamens in the short-styled form ; Fig. 3, the calyx, style, and stigma, natural size ;



ANALYTICAL DRAWINGS OF THE PRIMROSE ORDER—continued.

Fig. 4, the gynæceum ; Fig. 5, the same, enlarged and dissected to exhibit the ovules ; and Fig. 6, the unripe capsule with the calyx.

The fourth line represents the Wood Loosestrife or Yellow Pimpernel (*Lysimachia nemorum* Linné), Fig. 1 showing the corolla of natural size and especially the remarkable outline of the lobes, united into a mere ring below and each then widening from a narrow base and with an acuminate apex rare in petals. Fig. 2 is the calyx ; Fig. 3 shows the convolute æstivation and the superposed stamens ; Fig. 4, the glandular margin of the petal ; and Fig. 5, a stamen, both magnified ; Fig. 6, the unripe fruit with long persistent style ; Fig. 7, the same when ripe, seen from above, with withered calyx ; and Fig. 8, the same dehiscing.

The fifth line of figures illustrates the Scarlet Pimpernel (*Anagallis arvensis* Linné). Fig. 1 is a flower, of natural size, as seen from above ; Fig. 2, the flower of a partially double form, having supernumerary petals, from the same aspect ; Fig. 3 shows the glandular hairs bordering a petal (uncoloured) and on the filament of the superposed stamen, enlarged ; Fig. 4, the calyx ; Fig. 5, the calyx and gynæceum ; Fig. 6, an unripe fruit with the persistent style and calyx ; Fig. 7, the same, when ripe, showing the transverse, or circumscissile, dehiscence and the seeds round the free-central placenta within ; Fig. 8, an enlarged representation of one of the angular seeds ; and Fig. 9, the gland-dotted under surface of a leaf.

The sixth line of figures represents the Bog Pimpernel (*Anagallis tenella* Lightfoot), Fig. 1 being a flower in side view, natural size ; Fig. 2, a corolla-lobe enlarged, with its superposed stamen, showing the woolly filament ; Fig. 3, a highly magnified view of one of the moniliform hairs from the filament ; Fig. 4, the calyx and gynæceum, showing the transverse dehiscence ; Fig. 5, the segments of the calyx becoming wrapped round the fruit ; Fig. 6, the ripe fruit dehiscing and the seed-bearing placenta detached ; and Fig. 7, a seed.

The seventh line of figures illustrates the Thrift (*Statice Armeria* Linné), Fig. 1 being the flower as seen from above ; Fig. 2, the calyx ; Fig. 3, a corolla-lobe and stamen ; Fig. 4, the same seen laterally ; Fig. 5, the gynæceum enlarged ; Fig. 6, a capitulum in the fruiting stage ; and Fig. 7, the parachute-like persistent calyx in that stage.

The last line illustrates *Limonium humile* Miller, one of the Sea Lavenders, which are not popularly discriminated and so have no true popular names. Fig. 1 is a flower as seen from above ; Fig. 2, an enlarged longitudinal section of the upper part of the same, showing corolla, stamens, and styles ; Fig. 3, the lower part, showing the solitary, basal, anatropous ovule ; Fig. 4, a petal and stamen in lateral view ; Fig. 5, a lateral view of a whole flower, natural size ; Fig. 6, the calyx ; and Fig. 7, the gynæceum, the latter slightly enlarged.

CCXV.—THE ASH.

Fraxinus excelsior Linné.

A comparatively small proportion of the *Sympetale* assume the dimensions of trees and most of those that do so are Tropical forms. Engler's third Order, the *Ebenales*, is largely made up of such Tropical trees and has no British representatives. His fourth Order, known from the usually convolute corollas of its flowers by the somewhat unfortunate name *Contortæ*, contains plants of all sizes, natives of all latitudes. They usually have opposite, exstipulate leaves ; from two to six parts in each floral whorl ; a single whorl of stamens which are generally epipetalous ; and two united carpels. Besides several mainly Tropical Families, of which the largest is the *Asclepiadaceæ*, the Order includes three Families possessing British representatives, the *Oleaceæ*, *Gentianaceæ*, and *Apocynaceæ*.

The Olive Family, or *Oleaceæ*, numbers some twenty genera and four hundred species, shrubs and trees, belonging mostly to Tropical or Warmer Temperate latitudes. Besides the valuable tree that gives its name to the Family, the Ashes, Lilacs, Privets, and, by most modern botanists, the Jasmines, are included in this group. The leaves may be either simple or compound, and the inflorescence racemose or cymose ; whilst the flowers are polysymmetric and generally perfect, consisting usually of four united valvate sepals, four united petals, two epipetalous stamens, and two carpels united as a superior ovary. The fruit differs in character in almost every genus of the Family ; and, as in the Common Ash, some of the flowers may be apetalous and unisexual.

The genus *Fraxinus* includes some forty species, natives of the Northern Hemisphere. They are deciduous trees with simple or imparipinnate leaves and wind-pollinated flowers which are generally polygamous and may, as in our species, be entirely destitute of any perianth. On the other hand, they may, as in the Manna Ash of southern Europe (*Fraxinus Ornus* Linné), have both calyx and corolla. There are two or three ovules in each of the two chambers of the ovary, which becomes a flattened samara with a single terminal wing ; but as a rule only one ovule in each ovary becomes a seed.

The distinctive characters of our one British species, *Fraxinus excelsior* Linné, are the absence of the perianth and the pinnate leaves of from nine to seventeen oblong-lanceolate, serrate leaflets. Although the etymology of the Classical Latin *Fraxinus* is unknown, there can be little doubt that the specific name *excelsior*, the comparative of *excelsus*, lofty, which Linnæus adopted from Bauhin, means "very lofty" ; and, since this species attains heights of eighty or ninety feet, it is certainly appropriate. Though capable of growing in almost any soil and at altitudes of 1,350 feet in Yorkshire and 4,000 feet in the Alps, the Ash requires shelter for its perfect development and loves a deep, well-drained, rich loam. As the old ballad says :—

"The Oak, the Ash, and the Ivy tree—
Oh, they flourish best at home in the north countrie."



THE ASH—continued.

The smooth ashen-grey bark of the bole has been supposed to be the origin of the Old English name Ash. The twigs are slightly greener and are noticeably flattened below each node, whence spring the prominent bases that support the heavy leaves and are afterwards marked by the large leaf-scars. The short, oval, wedge-shaped, black buds in the leaf-axils distinguish our species from its American congener (*F. americana* Willdenow) in which they are greenish white. They owe their blackness to thickly set flattened hairs filled with a dark resin ; and, as the scales bearing these hairs grow, they are separated, so that, as Tennyson implies, they are at their blackest "in the front of March" and become greener later. In April or May, before the leaves unfold, rich vinous clusters of flowers burst from the axils. These may be polygamous, simple flask-shaped ovaries appearing first, followed by pairs of stamens with purple-black anthers, and by perfect flowers possessing both ; but many Ash-trees are either exclusively male or exclusively female. It is not till June or July as a rule that the leaves unfold.

"The tender Ash delays
To clothe herself when all the woods are green."

Then it is that the play of light through the foliage gives the airy lightness to the tree which earned for it William Gilpin's name of "Venus of the woods."

There is a deep groove down the upper surface of the midrib with openings, lined with hairs, opposite the leaflets. These have been supposed to be for the absorption of rain-water ; but are also said to serve, like the tufts of hair on the Linden leaf, as domatia for mites.

The dense drooping clusters of glossy sap-green "keys" or strap-shaped samaras take on a blackish hue and then turn to light brown, often hanging on until the spring. Evelyn says that they were formerly pickled when green "as a delicate salading."

Tougher and more flexible than any other European wood, Ash can be cut for walking-sticks when four years old, and for spade-handles at nine : both Greeks and Romans used it for spears, as did our modern Lancers ; while its use for the handles of ploughs and axes, and for the spokes and felloes of wheels, makes it emphatically "the husbandman's tree." It is used also for carriage-poles, oars, and golf-clubs, and when of large dimensions is in constant demand for artillery-waggon and other ordnance purposes. Though its long roots just beneath the surface, robbing the corn of its water-supply, make it unpopular with the farmer when in his hedgerows, when cut it is, indeed, as Spenser described it, "for nothing ill."

CCXVI.—THE PRIVET.

Ligustrum vulgare Linné.

THE genus *Ligustrum*, like several other members of the Family *Oleaceæ*, is mainly distinguished by the character of its fruit. It comprises some thirty-five species, most of which are Asiatic. Many forms from China, Japan, and northern India are now in cultivation. In the latter region they attain the dimensions of trees ; but most of the species are, like our British form, merely large shrubs from six to ten feet high. *Ligustrum vulgare* Linné, our Common Privet, is the only European species and its area of distribution extends into northern Africa.

They have opposite, entire, ovate leaves, which vary in duration, being often nearly or completely evergreen. Their young branches terminate in much-branched panicle cymes, which are often described as “thyrsoid,” from the resemblance of their pyramidal outline to the thyrsus, or garlanded pole, in the Classical representations of Dionysos or Bacchus. The individual flowers are generally small and white, homogamous, but with a copious supply of honey and a powerful perfume. The short, tubular, four-lobed calyx is deciduous : the four-lobed corolla is funnel-shaped : there are two included stamens ; and the two united carpels, each with two ovules, form a superior two-chambered and two-seeded berry.

The name *Ligustrum*, used by Virgil and by Pliny, is most probably connected with *ligare*, to bind, the fairly long and flexible shoots having been used, like osiers, not only in basket-making, but also for tying up faggots. There seems to have been much dispute as to whether the European species was known to the Greek herbarists and, if so, under what name ; while the early English vocabularists seem to have got into great confusion as to its identity, especially owing to its having been known as *Primrose*. Thus in Ælfric’s tenth-century Vocabulary, printed by Professor Earle, we have “*Ligustrum*, hunisuge” : another list, dating from the thirteenth century, gives “*Ligustrum*, triffoil, hunisuccles” ; while two fifteenth-century lists have it as the name of “primerolle,” “a primerose” and “a cowslowpe.” Turner, however, in his “*Libellus de re herbaria novus*” of 1538, which has been truly designated “the first publication in this country of a true Botanical cast,” writes to the effect that

“*Ligustrum* is a tree not a herb as the common herd of men of letters believe it to be, and is nothing less than a Prymerose. Vergil in the verse,

‘Alba ligustra cadunt vaccinia nigra leguntur’ ;
‘They fell white privet, black whortleberries are gathered,’

spoke not of the branches but of the white flowers of this tree. *Ligustrum* in Greek is called Cyprus, officinally *Ligustrum*, Alcanna or Henna. Whichever of these names you please may therefore be used as an English name until some fitter name occurs to us.”

Ten years later, in his “Names of Herbes,” he terms it “in englishe Prim print or priuet” ; and in the Second Part of his “Herball,” in 1562, he writes :—

“Pryuet groweth very plentuously in Cambrick shyre in the hedges.”



THE PRIVET—continued.

Tusser, in his "Five Hundred Points of Good Husbandry" (1573), has the name under the forms *Prie*, *Prim*, *Primwort*, and *Privy*; and Gerard uses *Primprint*, which is the French *Prime printemps*, first spring. The name, like Primrose, undoubtedly came originally from the Italian *Primaverola*, though it has been gravely suggested that it originated in

"one of its chief uses being for the formation of hedges in ornamental gardens, owing to its bearing clipping or being kept in prim order without injury."

Of this use of the shrub Parkinson writes that it is

"wrought and cut into many formes of men, hoises, birdes, &c. as the workeman list supported at the first with timber, poles, and the like, but afterwards growing strong of it selfe, sufficient to hold it in the forme it is made into."

The Privet flowers in June and July; and on a hot day at that season alongside tall hedgerows on a chalky soil we have often found the perfume of its masses of blossom quite overpowering. The flowers are visited by a variety of bees, butterflies, flies, and beetles, so that cross-pollination must, no doubt, often take place. It is curious to notice how in the flickering light amidst the green shade of its branches the large, green, purple-streaked caterpillar of the Privet Hawk-moth is often effectively concealed; and an outlook should be kept on tree trunks in the neighbourhood of the shrub for the large and beautiful moth itself, with grey fluffy wings and a body banded with bright rose-colour and black.

The flowers fade to a rusty brown, and are followed in August and September by the polished spherical berries, which ripen from an olive-green to a true black, though filled with purplish juice. These berries are not eaten by birds until almost every other kind of hedgerow fruit has disappeared, so that they often form a conspicuous feature on the bushes when the leaves may have fallen. In mild winters, however, or in sheltered situations, the Privet may retain its leaves until those of the next year's crop are unfolding; and this—as is the general rule—is more frequently the case on clipped bushes. Being tolerant of the drip from other trees, Privet is useful for undergrowth in shrubberies or game-preserves; whilst being also fairly proof against smoke it is naturally in request in town gardens.

In a wild state, in England, the Lowlands of Scotland, and the south of Ireland, it is most abundant on calcareous soil; but is by no means confined to it.

The berries have been used in dyeing pink and green, and, it is said, in colouring port wine; and a bland oil, used in cooking, is expressed from them in Germany. The young twigs, dried and powdered, have been used in tanning in Belgium and Siberia.

CCXVII.—THE CENTAURY.

Centaurion umbellatum Gilibert.

THE Family *Gentianaceæ* is a considerable one, numbering some 750 species in more than sixty genera. Distributed throughout all climates, from the regions of perpetual snow to the hottest parts of South America and India, they are mainly northern and sub-alpine. They are very rare in both the Arctic and the Antarctic Regions : on Behring Strait and on the Straits of Magellan they occur just above sea-level : in southern Europe they are represented at altitudes of from 6,000 to 9,000 feet : in the Himalaya and in the Rocky Mountains they reach 16,000 feet ; and under the Equator they do not occur below 7,850 feet above the sea. They are adapted to a great variety of conditions, the group including saprophytes, aquatic and marsh plants, halophytes, and stunted alpine. Most of them are herbaceous, erect, and glabrous, though often perennial with persistent rhizomes. Their leaves are usually opposite, exstipulate, sessile, and entire ; and their inflorescence, a trichasial or dichasial cyme. The flowers are polysymmetric and perfect and pollinated by insects. They are often relatively large and remarkable for their clear brilliant colours. In South America and New Zealand the prevalent colour among them is said to be red, whilst in Europe it is blue—yellow, white, and other colours being less common. There are usually five, but sometimes four, parts in each of the three outer floral whorls, the sepals being inferior, united, and persistent, and the stamens forming a single whorl, epipetalous, but alternating with the corolla-lobes. There are two united carpels, forming a one-chambered, septicidal, many-seeded capsule : the placentation is parietal : the style is single ; and the ovules are anatropous. All the members of the Family are intensely bitter and many of them furnish valuable tonic medicines.

Engler subdivides the Family into two Sub-Families, the *Gentianoideæ*, including *Centaurion*, *Blackstonia*, *Gentiana*, etc., and the *Menyanthoideæ*—to which *Menyanthes* and *Nymphoides* belong—with scattered leaves.

The genus *Centaurion*, like the allied *Chironia*, and *Centaurea* among the *Compositæ*, a genus including the Blue Cornflower and the Knapweeds, commemorate that interesting figure in Greek mythology the Centaur Chiron. Modern rationalism sees only in these picturesque monsters, half man and half horse, the Thracians who hunted the wild bull on horseback, transfigured into this dual being by Greek imagination, as were the Spanish cavalry, when first seen, by that of the natives of America. It is difficult, however, to destroy the poetry of the story. Chiron, the weird horseman of the woods of Mount Pelion, of immortal parentage, was taught by Apollo and Artemis—twin hunters of the heavens—by Sun and Moon, as is every one who leads the life of the woods ; and thus became skilled alike in the chase, in medicine, and in music. Hercules, Achilles, and Æsculapius were among his pupils, and the genera *Heracleum*, *Achillea*, and *Asclepias* commemorate the



THE CENTAURY—continued.

medical lore that he imparted to them. Fatally wounded by one of the arrows of Hercules—poisoned with the bile of the Lernean Hydra—Chiron was placed among the constellations as Sagittarius.

This beautiful genus, named in his honour, comprises some thirty species of annual or perennial plants, mostly natives of the North Temperate Zone. They have erect, square stems and their leaves are more or less connate at the base. The parts of the flowers may be in fours, but are usually five in a whorl : the calyx is divided to its base ; and the funnel-shaped corolla may be pink, white, or yellow. There is no free honey in the flower ; but the corolla-tube is probably pierced by insects for the sweet sap in its internal tissue. Differences in the length of the style and in the pollen have been observed, though definite heterogony has not been demonstrated. The flower is homogamous, and the exerted anthers as they wither become spirally twisted. Except in bright morning light, the petals are closed over both anthers and stigmas. In the most generally distributed of the five British species, *C. umbellatum* Gilibert, described in many books under the name *Erythraea Centaurium* Persoon, the flowers open between five and seven o'clock in the morning and begin to close about noon ; but they close if the sky becomes overcast and reopen five days in succession.

In a manuscript Vocabulary of the eleventh century, quoted by Professor Earle, we have "Centauria, heorth-gealla," *i.e.* earth-gall. Turner, in his "Libellus" (1538), writes :—

"Centaurii duo sunt genera, maius & minus. . . . Minus libadion fel terre & febrifugia dicitur, angli uocant Centory."

"There are two kinds of *Centaurium*, *majus* and *minus*. . . . *Minus* is called *libadion*, earth-gall, and feverfew. The English call it *Centory*."

Libadion is Pliny's name and refers to the plant's love of moist places ; whilst the other names are appropriate references to the intense bitterness of the plant, which, before the days of quinine, made all the members of this Family valuable as febrifuges and tonics. In the north of Scotland an infusion of this plant is still drunk medicinally under the name of *Gentian*. Dr. Prior even attempts to explain the pretty name *Christ's Ladder*, which he finds in fourteenth-century catalogues, as arising from a mistake of *Christis-galle*, alluding to the bitter draught offered to Our Lord in the Passion, for *Christi scala*. In Manx, however, we find the purely poetical *Keym Chreest*, *i.e.* *Steps of Christ* for this beautiful flower that stars the meadows with its clustering pink blossoms.

Gerard's description of it is terse and graphic :—

"The lesser Centorie," he writes, "is a little herbe : it groweth vp with a cornered stalke, halfe a foot high, with leaues in form and bignesse of Saint Iohn's woorst : the flowers growe at the top in a spokie bush or rundell, of a red colour tending to purple, which in the day-time, and after the sunne is vp doe open themselues, and towardes euening do shut vp againe : after them come foorth small seede vessels, of the shape of wheate cornes, in which are contained very little seedes."

CCXVIII.—THE PERFOLIATE YELLOW-WORT.

Blackstonia perfoliata Hudson.

WITH that perception of natural affinities upon which we have previously commented, the early botanical writers mostly recognise a close connection between the Centaury, though best known with pink flowers, and the Yellow-wort. The two may sometimes be found growing side by side on some sunny bank of chalk, when the resemblance in their general habit—stiff, erect, and cymosely branched—their opposite, united, and entire leaves, and their star-like blossoms, is at once apparent. The Yellow-wort is, however, less generally distributed than the pink Centaury.

The earliest references we have been able to trace to the beautiful plant now known as *Blackstonia perfoliata* Hudson are those in the little undated herbal professedly edited by Henry VIII's illustrious physician Linacre, and published as "Macer's Herbal. Practysd by Doctor Lynacro," and in that published in 1550 as "A litle Herball by Anthony Askham, Physycyon," both of which books, copying from the same original, speak of it as *More Centory* or *Earthgall*. The undated book, possibly the earlier, since Linacre died in 1524, says :—

"More Centory or Earthgall hath leves lyke to the Lesse Centory, but more whyter, and yelow flowers, and flowreth not but in the top."

Askham similarly fixes the identity of the plant of which he is writing by saying :—

"It is named the More Centory or Earthgall : his floures be yelow in the crope."

Twenty years later Pena and Lobel, in their "Adversaria," write of it as *Centaureum luteum*, and as occurring on the hills above Bristol ; and in 1597 Gerard, who styles it *Centaureum parvum luteum Lobelii*, says :—

"The yelow Centorie hath leaues, stalkes, and seede like the other [*Centaureon umbellatum* Gilibert], and is in each respect alike, sauing that the flowers heereof are of a perfect yelow colour, which setteth foorth the difference" ;

adding that the plant occurs "upon the chalkie-cliffes of Greenhithe."

In Bauhin's "Pinax" (1671), the plant bears the name *Centaureum luteum perfoliatum* which it retained in general use until the times of Ray and Blackstone. Ray in his "Synopsis" says that it grows in mountainous and rather dry pastures, and adds that its leaves are noteworthy, the opposite pairs being united, as in the Teazle, and of a glaucous colour, while the flowers are yellow and divided into eight lobes.

In his "Species Plantarum" (1753) Linné placed the plant under the genus *Gentiana*, with which it is unquestionably nearly related ; and it was not until the twelfth edition of his "Systema Naturæ" (1766) that he adopted, from Paul Renealm's "Specimen Historiæ Plantarum" of 1611, the name *Chlora*. This name, obviously derived from the Greek *χλωρός*, *chloros*, yellow, with reference to the flowers, has been in general use until recently, when it became apparent that, under



THE PERFOLIATE YELLOW-WORT—continued.

the laws of priority, it must be replaced by *Blackstonia*, the name by which William Hudson in his "Flora Anglica" (1762) worthily commemorated an excellent English botanist.

Of John Blackstone comparatively little personal information exists. He appears to have been apprenticed to an apothecary in the Strand, perhaps from 1733 to 1740, and to have frequently visited Francis Ashby of Breakspears at Harefield, Middlesex. In 1737 he published a little book entitled "Fasciculus plantarum circa Harefield sponte nascentium," with an appendix on the geology and other characteristics of this district. This book was dedicated to Sir Hans Sloane. In 1740 he was established in business as an apothecary "at the Griffin near Salisbury Court, Fleet Street"; and in 1746 he published his "Specimen Botanicum," a list of localities for the rarer plants of England, arranged, as the Harefield list had been, in alphabetical order. This work, so far as its nomenclature is concerned, is described by Pulteney as "the last book published in England, on the indigenous botany, before the system of Linnæus had gained the ascendancy over that of Ray." Blackstone died in 1753.

Though not absolutely confined to calcareous soil, the Perfoliate Yellow-wort is chiefly found on such formations. It is an annual plant, and there seems formerly to have been some tendency to regard as distinct the more luxuriant and branched forms and the depauperated examples, which are often very small, slender, and unbranched. The whole plant is glabrous and glaucous, and Lord Avebury states that the smooth connate leaves serve as an obstacle to small crawling insects. Several stems may proceed from one root: they may reach eighteen inches in height and be slightly branched; and they are circular in section. There is at first a rosette of radical leaves with rounded points; but these often wither; while the connate, acute, cauline ones are known by the misleading term "perfoliate." Sepals, petals, and stamens all usually number eight, each in one whorl, the calyx-lobes being deeply divided; and the corolla, having but a short tube, is often described as rotate. The flowers have neither scent nor honey, but they only expand between nine and ten in the morning and close at about four. They are protogynous. The corolla persists, and the capsule, when ripe, bursts through the corolla-tube. The flowering season is from June to September.

Our only British species ranges over most of Central and Southern Europe and into North Africa and Western Asia; and there are four other European species, all mainly southern. The cool grey foliage and bright blossoms, spreading, as it seems, with eagerness in the full glare of the sun, suggest this geographical distribution.

The Yellow-wort shares the tonic bitterness of the Family and is said to yield a yellow dye.

CCXIX.—THE SPRING GENTIAN.

Gentiana verna Linné.

AMONG the fancy portraits on the title-page of Dodoens's Herbal, to which we have before alluded, is one of a certain Gentius, last King of Illyria, who is stated by Pliny to have first discovered the medicinal virtue of the plant named after him, and who was conquered by Rome in 168 B.C. Like many other such royal remedies, Gentian owed much of its early repute to its alleged value as an antidote to poison.

The genus *Gentiana* is by far the largest in the Family to which it gives its name, comprising in all some three hundred species, of which less than forty are European and only five or six are British. The great majority are alpine plants, with the perennial tufted habit and relatively large and brilliantly-coloured flowers characteristic of that biological group. Some species ascend to an altitude of 16,000 feet in the Himalaya, and the majority belong to the mountains of the Northern Hemisphere. They are, however, represented in the Andes—to which region the red-flowered species are mainly confined—in Australia, and in New Zealand. All of them are herbaceous plants with opposite, sessile, and often strongly-ribbed leaves, both stem and leaves being usually glabrous. Their flowers are either solitary and terminal, or in erect, somewhat rigid dichasial or trichasial, cymes, and are usually pentamerous, though occasionally tetramerous. The calyx is valvate, and the funnel-shaped or salver-shaped corolla sometimes has pleated folds between its lobes, and the tube lined with hairs or furnished with scales. The epipetalous stamens are included and the single style is surmounted by a bilobed, persistent stigma. The fruit is a septicidally two-valved, one-chambered capsule, with numerous seeds. Although mostly of a lovely blue, the flowers of the genus comprise yellow, white, pink, and red forms. In colour, length, and width of corolla-tube and other structural characters the species form ascending series, adapted to lower and higher types of insect pollen-bearers. Grant Allen used such series to illustrate the principle laid down by Alfred Russel Wallace that colour is most apt to appear or to vary in those parts of plants or animals which have undergone the highest amount of modification.

"In this way," he writes, "we may put it down as a general rule that the least developed flowers are usually yellow or white; those which have undergone a little more modification are usually pink or red; and those which have been most highly specialised of any are usually purple, lilac, or blue. Absolute deep ultramarine probably marks the highest level of all.

"On the other hand, Mr. Wallace's principle also explains why the bees and butterflies should prefer these specialised colours to all others, and should therefore select the flowers which display them by preference over any less developed types. For bees and butterflies are the most highly adapted of all insects to honey-seeking and flower-feeding . . . And if the more specialised and modified flowers, which gradually fitted their forms and the positions of their honey-glands to the forms of the bees or butterflies, showed a natural tendency to pass from yellow through pink and red to purple and blue, it would follow that the insects which were being evolved side by side with them, and which were aiding at the same time in their evolution, would grow to recognise their developed colours as the visible symbols of those flowers from which they could obtain the largest amount of hunger with the least possible trouble. Thus it would finally result that the ordinary unspecialised flowers, which depended upon small insect riff-raff, would be mostly left yellow or white; those which appealed to rather higher insects would become pink or red; and those which laid themselves out for bees and butterflies, the aristocrats of the arthropodous world, would grow for the most part to be purple or blue."



THE SPRING GENTIAN—continued.

The genus *Gentiana* divides into two sub-genera, according to the position of the nectaries : in *Eugentiana* they are on the base of the ovary ; and in *Gentianella* they are on the base of the corolla-tube. In each sub-genus a series of progressively, more highly specialised flowers can be traced. In the sub-genus *Eugentiana*, *Gentiana lutea* Linné, which was, no doubt, the species of which Gentius discovered the medical virtues, is a tall yellow-flowered form in the Alpine mountains. Its corolla is rotate : it is homogamous and its honey is freely exposed, so as to be accessible to any short-tongued insects. The magnificent Marsh Gentian (*G. Pneumonanthe* Linné), with large blue, white, or rarely pink flowers, which is found on some of our boggy heaths, has a long wide tube without hairs, is protandrous, and is chiefly pollinated by humble-bees ; but the Spring Gentian (*G. verna* Linné) has a longer and narrower corolla, with two scales on the pleat between each lobe, and is visited chiefly by butterflies. A similar series can be traced in the sub-genus *Gentianella*, which includes our more common upland species *G. Amarella* Linné and *G. campestris* Linné.

As the opening blossoms of the dwarf blue Gentians melt their way through lingering alpine snow-drifts, or cover with a profusion of flowers from their matted stems the little lawns bounded by rocks or glaciers, they have well been described as

“The heavens up-breaking through the earth.”

Among these none is more beautiful than *G. verna* ; and, though Gentians are by no means easy of cultivation, it has now become a great favourite for the rock-garden. In our islands it is of very limited distribution, being confined to Teesdale and a few localities in the west of Ireland. Where it does occur, however, on wet limestone rocks, it is often abundant ; but its conspicuous beauty endangers its very existence. Vandals, filled only with a desire for filthy lucre, ruthlessly uproot it in quantity ; so that it is one of the most striking examples of the necessity of some Wild Plant Protection Act, if those who come after us are to enjoy the beauties of Nature to anything like the extent to which we are able to do. Its deep blue blossoms appear from March to June, and in Ireland it reaches altitudes of 2,400 feet, though abundant at far greater elevations in the Alps and other mountains of Central Europe and northern and western Asia.

The medicinal value shared in varying degrees by all kinds of Gentian, and for which some forty species are employed in different parts of the world, depends upon a pure bitter principle resembling tannin. *G. campestris* has been used in Scandinavia as a substitute for hops ; and, as the roots of the Yellow Gentian also contain some sugar, a cordial, known as Enzianbranntwein, is made from it in Switzerland and Bavaria.

CCXX.—THE BUCKBEAN.

Menyanthes trifoliata Linné.

THE Sub-Family *Menyanthoideæ* is distinguished from the *Gentianoideæ* by having scattered leaves and by the æstivation of the corolla, the corolla-lobes having their margins induplicate or rolled inwards and then meeting in a valvate manner, *i.e.* without any overlapping. It includes the two genera *Menyanthes* and *Nymphoides*, each of which is represented in Britain by a single species. *Menyanthes* seems, in fact, to be a monotypic genus, the most striking feature of which is certainly its trefoil leaf. It is widely distributed throughout Europe and in parts of Asia and North America; but seems almost as invariable as it is isolated systematically. The name *Menyanthes*, used by Theophrastus, is supposed to be derived from the Greek μήν, *men*, a month, and ἄνθος, *anthos*, a flower, and to refer to the duration of individual blossoms; but was probably first used for some other plant.

The Buckbean (*Menyanthes trifoliata* Linné) is a perennial, with a dark-coloured, stout rhizome, which creeps in the mud and sends out thick adventitious roots with no root-hairs. This rhizome, like those of the Water-lilies, is filled with a store of starch, which has been used in Lapland as meal in times of scarcity. The ascending fleshy branches have numerous short internodes and rise but little above the mud or water in which the plant grows. We have known the stems so matted together as to form a layer of peat more than a foot thick over the surface of water on which a man could walk, though it shook for some yards round. The ternate leaves have thick round petioles with sheathing membranous bases, and each obovate leaflet has a thick midrib and a wavy margin.

While the habitat of the plant and the form of its leaves fully justify the name *Trifolium paludosum* and the translation *Marsh Trefoil*, which we have in Gerard, and the French equivalents *Trèfle des marais* and *Trèfle d'eau*, the texture of the leaves naturally suggested the comparison with the Broad-bean, which is embodied in the other names of the plant. In these, however, we have probably instances of mistaken etymological emendation. It has naturally been thought that *Buckbean* might be only a corruption of *Bog-bean*, a name by which the plant is now often known; but, as Dr. Prior points out, in all the old herbals it is *Buckles-beane*; the German name is *Bocksbohne*, and the Dutch *Bocksboonen*; and these names mean that the plant was considered a remedy for the “scharbock” or scurvy, that word being itself a corruption of the Latin *scorbutus*.

The comparatively coarse aspect of the foliage is but a foil, however, for the fairy-like delicacy of the blossom. Given off from the stem opposite a leaf, a stout terete peduncle bears a bracteate raceme of numerous beautiful flowers on short spreading pedicels. They each have five blunt, short segments to the calyx; while the funnel-shaped corolla has five long recurved fleshy lobes, delicately tinged with pink externally but pure white within, and fringed with long lace-like white hairs.



THE BUCKBEAN—continued.

There are five hypogynous honey-glands at the base of the corolla-tube : the five epipetalous stamens have subulate filaments and reddish anthers, with their chambers widely divergent at the base ; and the globose ovary is surmounted by a single style, with a slightly lobed stigma, and becomes a loculicidal capsule. The lovely fringe of the petals has been explained as rendering the flower more conspicuous and as a protection against rain ; but it seems to us more concerned with the exclusion of unwelcome insect-visitors. In Greenland, according to Warming, and apparently in some other places, the flowers are homomorphous, *i.e.* all have stamens and styles of the same length ; but in England, Holstein, and elsewhere they are dimorphically heterogonous like those of *Primula*. The long-styled form, in which the stigma is exserted, has a smaller stigma with finer papillæ on its surface and oval pollen-grains about half the size of those of the other form. In this short-styled form, on the other hand, the anthers are exserted and produce large oval pollen-grains, and the stigma is larger, bilobed, and relatively coarsely-papillate. The flowers are said to be seldom visited by flying insects during the day ; but we have frequently noticed small crawling insects entangled in the fringe of hair round the petals.

In reed-swamps, while Meadow-sweet, Purple and Yellow Loosestrife, and Valerian dominate the bank, with a lower growth of Marsh Marigold, Ragged Robin, and Square-stalked St. John's-wort, and *Hypericum elodes*, *Hydrocotyle*, and *Viola palustris* as a ground vegetation, the Forget-me-not, the Marsh Cinquefoil, and the Reed (*Phragmites*) advance farther into the water ; but the Buckbean will often go beyond them all. It seldom, however, grows in very deep water. The bright green foliage and, still more, the beautiful flowers, have made it a favourite for planting in ponds and tanks. It is not difficult to propagate, the rhizome being divided and the pieces pegged down in the mud. If it is given room enough it will cover wide stretches of water with its leaves and blossoms.

The whole plant abounds in a powerful and wholesome tonic bitter, which has, perhaps, been unduly neglected by our pharmacists. The leaves are still used as a remedy for ague and rheumatism in the Cambridgeshire fens, in the form of an infusion. They have a powerful sudorific effect. Linnæus mentions their use in Sweden as a substitute for hops, a purpose to which they have been applied in more recent times in Silesia and other parts of Germany, and, judging from the local name *Bog-hop*, also, it would appear, in the north of England.

CCXXI.—THE WATER VILLARSIA.

Nymphoides peltatum Britten and Rendle.

STRANGE indeed are the chances of botanical nomenclature. One of the commonest of plants, such as the Bluebell, may be bandied about from genus to genus so that the botanist becomes hopelessly beset with doubt as to the name the plant should bear according to the rules; or another species, possibly uncommon, may have, like the Buckbean, received both its scientific names from Linnæus under circumstances which have never caused a moment's doubt in the minds of modern workers. So too with popular names, many comparatively insignificant plants have long been popularly known, perhaps as weeds or for some rustic use to which they are put, and have various familiar names in different parts of the country; while, on the other hand, a plant of rare and conspicuous beauty may never have received a genuine popular name, as opposed to the mere "book-names" given by botanists, which may, or may not, catch the popular taste and so pass gradually into the category of truly popular names. A plant of this last class is the subject of this Plate.

Flourishing in sluggish or stagnant waters, not too deep to allow it to float on the surface while rooted in the mud at the bottom, it is not very uncommon in the south-east of England from the Cambridgeshire fens to Sussex, and is especially abundant in the Thames below Oxford or more particularly between Windsor and Hampton. It was first recorded in 1570, was formerly more widely distributed than at present, and is so pretty that it has frequently been introduced into private pieces of water. And yet it cannot be said to have any truly popular name, whilst its Latin denomination is also beset with such considerable doubt that it may have to bear a name only coined in its entirety in 1907. The general habit and texture of the plant and its round, floating, heart-shaped leaves naturally suggested to the early systematists that it should be put among Water-lilies. Pena and Lobel, in their "Adversaria" of 1570, call it *Nymphaea lutea minor Septentrionalium*, i.e. the lesser yellow Water-lily of the North, and give as its locality:—

"Juxta amœnissima Tamesis fluentia in udis scrobibus et lacustris pratensibus."
"Near the most pleasant waters of the Thames, in moist ditches and meadow pools."

Noticing the fringed petals which suggested to Linnæus the plant's undoubtedly close affinity to the Buckbean, the Bauhins both speak of it as *Nymphaea lutea minor flore fimbriato*, the lesser yellow Water-lily with a fringed flower. Tournefort, however, recognising the floral characters which separate it so widely from the Water-lilies, proposed for the plant the name *Nymphoides*, meaning, no doubt, as Sir J. E. Smith points out, to compare it, not to a nymph, but to a *Nymphaea*. At the same time, under our present rules, we cannot alter this, as Smith did, to *nymphæoides*, and under no circumstances could we follow him in so altering it even when professing to quote Linnæus, Ventenat, and Wiggers, all of whom wrote it *nymphoides*. Linné in his "Species Plantarum" (1753) united the plant in the same



THE WATER VILLARSIA—continued.

genus with the Buckbean as *Menyanthes nymphoides*, and in following this nomenclature Smith uses the English names *Fringed Buckbean* and *Fringed Water-lily*. This plant, however, and several exotic allied forms differ from the Buckbean in that their capsules are indehiscent or burst irregularly, instead of opening in two valves, and they are thus entitled to rank as a distinct genus. For this S. P. Gmelin, in 1769, proposed the name *Limnanthemum*, from λίμνη, *limne*, a pool or marsh, and ἄνθεμον, *anthemon*, a flower, from which the inappropriate English name *Marsh-flower*, for a plant which floats on open water, has been coined. Wiggers, in 1780, called it *Waldschmidia*; and, in 1803, Ventenat gave it the name *Villarsia nymphoides*, in honour of Dominique Villars, author of a Flora of Dauphiné—a name which remained in general use for a century. The other species of *Villarsia* are, however, Australian and South African, and have the two-valved capsule as in *Menyanthes*. Tournefort's genus *Nymphoides* was, however, adopted by the brilliant but unprincipled Sir John Hill in his "British Herbal" of 1756, in which he uses the name *Fringed Water Lilly*; says that the plant is "not uncommon in shallow waters" and is abundant about Brentford; and asserts that in its qualities it is nearer to the Water-lilies than to the Buckbean.

The floating leaves spring from the flower-bearing axis a little below the surface of the water, which is, as Goebel points out, a decided physiological advance upon the arrangement in the Water-lilies, in which all food-material manufactured by the leaf has to travel down to the rhizome in the mud at the bottom, only to return by the peduncle to the surface, if required for the nourishment of the flower or fruit. The leaves, like those of Water-lilies, are usually coloured with anthocyan on their under surfaces and in spots on the upper surface, an adaptation probably, as we have seen, for the conversion of light into heat; and the under surfaces are also studded with glands.

The bright buttercup-yellow flowers are in sessile umbels, and one at a time the buds rise above water, opening as they do so. The five lobes of the calyx take an ascending direction and the corolla is funnel-shaped, expanding to an inch or more in diameter, its segments having an irregularly cut margin, while the tube is closed by fringed scales. The honey thus concealed is secreted by five purplish glands between the bases of the stamens, and the flower is dimorphically heterogonous, the long style being half as long again as the short one. After fertilisation the peduncle bends so as to withdraw the ovary beneath the water until the fruit is ripe.

Where it occurs, this beautiful aquatic covers the water with its heart-shaped leaves and golden blossoms. It grew formerly at Chelsea, Richmond, and Kingston, and a few years ago covered the ponds in Richmond Park. The name *Floating Heart* has been recently suggested for it by florists, who recommend it for planting where it can be kept within bounds.

CCXXII.—THE LESSER PERIWINKLE.

Vinca minor Linné.

THE Family *Apocynaceæ*, sometimes termed the Dog's-bane Family, is a large, mainly tropical, group, comprising at least a thousand species in about 130 genera. The Lesser Periwinkle (*Vinca minor* Linné) marks the most northerly extension of the Family in Europe, being almost certainly indigenous in our southern counties, as also in Belgium and Holland, though often occurring farther north as an escape from gardens. The Family includes but few trees or herbs, being mostly made up of twining and trailing shrubby plants, which in Tropical forests often become large woody lianes. They have a milky latex which is generally an acrid poison; but in several genera, such as *Landolphia* and *Funtumia* in Africa and *Willughbeia* in the East Indies, yields valuable rubber. They have opposite, simple, entire leaves, and polysymmetric, perfect flowers, often large and beautifully coloured, so that many of them, such as the Oleander (*Nerium Oleander* Linné), *Allamanda*, and the Periwinkles, are valued in our gardens and hot-houses. The calyx is deeply lobed, quincuncial, and persistent; the corolla salver-shaped or funnel-shaped and convolute. The stamens equal the petals in number, and are epipetalous and included, with very short filaments; and there are two carpels which may be free or united in the ovarian region but have only one common style.

The genus *Vinca* comprises some five species of slender perennial evergreen herbs, natives of Europe, Asia, and North Africa. Their evergreen foliage has given them the German names *Wintergrün* and *Sinngrün*, the Danish *Singroen*, and the sometimes-used English *Sengreen*; while a mistaken derivation of the Latin name from *vincere*, to conquer, instead of from *vincire*, to bind, has led to the fanciful suggestion that this name means the conqueror of winter. Trailing habit and evergreen foliage together unquestionably originated the oldest name we know for these plants, the Greek κληματίς δαφνοείδης, *klematis daphnoeides*, the laurel-like climber; but Pliny's name for it *Vinca pervinca*, which has given rise to most of its names in modern Europe, probably referred to its use for binding in chaplets. *Pervinca* occurs unaltered in Italian and in Portuguese, *Pervenche* in French, *Pervenke* in Chaucer, and even *Barwinck* in Polish. The easily-grown luxuriant trailing shoots with their glossy leaves and early cheerful flowers evidently made the Periwinkles favourites in English gardens at a remote period. The name "*Vinca, pervincæ*" occurs in Ælfric's tenth-century Vocabulary, and according to the doctrine of signatures the plant was considered "a great binder and stayeth all bleedings." Dioscorides states that to be efficacious

"this wort must be plucked when the moon is nine nights old, or eleven, or thirteen, saying, 'I pray thee, Vinca pervinca.'"

Turner in his "Libellus" (1538) writes:—

"Clematis daphnoides, Latinis vinca pervinca, anglis Perwyncle dicitur."

"Clematis daphnoides is called vinca pervinca by the Latins, by the English Perwyncle."



THE LESSER PERIWINKLE—continued.

In his Herbal (1551) he adds that *Vinca pervinca* or Periwinkle “groweth wylde in the west cuntre.”

The smaller species (*V. minor* Linné) is distinguished from the larger (*V. major* Linné), which has no claim to be considered a native British plant, by the rooting of its prostrate stems, and by the absence of a fringe of hairs on the margins of the leaves and the sepals.

The tough, round, trailing stems of *Vinca minor* are often from one to two feet in length ; and the flowers are produced in May and June on short erect branches. White, red-purple, and double flowers occur in gardens and forms with leaves variegated with white or yellow ; but the wild plant is very rarely any colour but a light violet. The tube of the salver-shaped corolla is eleven millimetres long, and the honey is secreted by two yellow glands at the base of the ovary and is protected from rain and probably from small insect marauders by hairs lining the throat of the corolla-tube. The stamens are attached about half-way up this tube : their short filaments bend inwards in a knee-like form below the stigmatic disk ; and the introrse anthers extend above it, terminating in an expanded hairy connective. The two carpels, very small in the flower stage, are separate in the ovarian region, but unite above into a remarkable little style and stigma which resembles a shaving-brush. The style thickens upwards and is surmounted by a structure resembling the capital of a column. The lower surface and edges of this are stigmatic ; the upper part is covered with minute hairs. The flowers are scentless ; but are freely visited by bees and long-tongued flies which can force their heads as far as the stigma, so that they only require a proboscis eight millimetres long in order to reach the honey. The anthers discharge their pollen inwards on to the collecting hairs above the stigma which it is prevented from reaching by the expanded disk and the knee-like filaments blocking the corolla-tube. The insect-visitors, however, thrust their tongues between the stamens and on withdrawing them sticky with honey carry some of the pollen again to the stigma of another flower. The Periwinkle, however, seems seldom to ripen its fruit in England. When it does so, the fruit consists of two elongated curved follicles, each containing a number of black tuberculate seeds.

Though generally found wild in woods on a warm sandy soil, Periwinkles can be readily cultivated in soil of any character, and their glossy leaves and bright flowers are useful for covering banks or rockwork and afford an excellent house-decoration in midwinter.

CCXXIII.—ANALYTICAL DRAWINGS OF THE OLIVE, GENTIAN, AND PERIWINKLE FAMILIES.

(*Oleaceæ*, *Gentianaceæ*, and *Apocynaceæ*.)

THE relationship between the three Families represented by the eight types analysed on this Plate, in accordance with which they are united in Engler's Order *Contortæ*, has been generally recognised by systematic botanists. As we have seen, opposite leaves, polysymmetric pentamerous flowers, gamopetalous corollas, stamens equalling the petals in number, and two united carpels are the rule throughout.

Of the two plants which here, as the only two indigenous species, represent the Family *Oleaceæ*, the Common Ash (*Fraxinus excelsior* Linné) is a remarkable illustration of the principles of the Natural System of classification, in that, though its flowers are destitute alike of calyx and corolla, it is placed among the *Sympetaleæ*. The tree may bear three kinds of flowers side by side, perfect, male and female; but only the perfect and male flowers are here shown, the former by Figs. 1 and 3 in the first row, the latter by Fig. 2. Fig. 1 shows the two free stamens and the flask-shaped gynæceum of an incomplete but perfect flower; Fig. 2, the two stamens which constitute a male flower, it being, of course, both incomplete and imperfect. Fig. 3 is the perfect flower in longitudinal section, showing the pendulous ovules in the two chambers of the ovary. Fig. 4 is a ripe samara opened and the seed removed from it. Fig. 5 shows the embryo, with elongated radicle, bent hypocotyledonary axis, and partially withdrawn cotyledons, issuing from the torn husk in germination; and Fig. 6, a seedling at a slightly later stage, showing the entire cotyledons and the undivided leaves of the first pair of foliage-leaves. Figs. 1 to 3 are enlarged; Figs. 4 to 6, of natural size.

The four figures in the second row, all of natural size, illustrate the Privet (*Ligustrum vulgare* Linné). Fig. 1 is the calyx and other parts of a young flower; Fig. 2 shows a whole flower later; Fig. 3, the style and bifid stigma; and Fig. 4, the calyx and undeveloped gynæceum, as seen from above.

The next five rows, all illustrating the Gentian Family, show, of course, even greater similarity than that which characterises the whole Plate; but they represent five distinct genera, out of the six which occur in Britain. The third line is the Centaury (*Centaurion umbellatum* Gilibert), the first four figures being of natural size. Fig. 1 is a flower, as seen from above; Fig. 2, a side view of the same, showing the bracteoles; Fig. 3, the corolla and stamens, seen from below; Fig. 4, the gynæceum; Fig. 5, the same, enlarged; Fig. 6, a transverse section of the ovary; and Fig. 7, the stigma, both enlarged.

The fourth line of figures illustrates the Perfoliate Yellow-wort (*Blackstonia perfoliata* Hudson), Fig. 1 showing the corolla dissected so as to exhibit the insertion



ANALYTICAL DRAWINGS OF THE OLIVE, GENTIAN, AND
PERIWINKLE FAMILIES—continued.

of the stamens ; Fig. 2 being the gynæceum ; Fig. 3, the twice-forked stigma ; Fig. 4, an opening flower-bud ; Fig. 5, the fruit enclosing in the persistent calyx ; and Fig. 6, a transverse section.

The fifth line represents the Spring Gentian (*Gentiana verna* Linné). Fig. 1 is the corolla, as seen from above, of natural size, showing the convolute oblique segments. Fig. 2 is the same opened so as to show the gynæceum and the insertion of the stamens. Fig. 3 shows the double pleat between the lobes of the corolla ; Fig. 4, the gynæceum, the form of the stigma being well seen ; Fig. 5, the same in longitudinal section ; and Fig. 6, the ripe fruit dehiscing septicidally.

The sixth line illustrates the Buckbean (*Menyanthes trifoliata* Linné). Fig. 1 is a flower, as seen laterally ; Fig. 2, the same, as seen from above ; and Fig. 3, a petal and a stamen, these three figures and Figs. 9 and 10 being of natural size. Figs. 4 and 5 are stamens in front and side view, showing the divergent anther-lobes ; Fig. 6, the gynæceum ; Fig. 7, a transverse, and Fig. 8, a longitudinal, section of the ovary ; Fig. 9, two fruits, not often seen in England ; Fig. 10, a cross section of a fruit ; and Fig. 11, a portion of the placenta with seeds attached to it.

The penultimate line of figures represents the Floating Heart or Villarsia (*Nymphoides peltatum* Britten and Rendle), Fig. 1 being the calyx ; Fig. 2, the corolla from within, showing the insertion of the five stamens ; Fig. 3, one of the *erose* or irregularly notched segments of the corolla ; Fig. 4, the gynæceum ; Fig. 5, the same enlarged, showing the honey-glands of the disk ; Fig. 6, a fruit ; and Fig. 7, a cross section through it.

The last line of figures illustrates the Lesser Periwinkle (*Vinca minor* Linné), the only British species of the Family *Apocynaceæ*. Fig. 1 is the flower, as seen from above ; Fig. 2, the same in side view, showing the deeply-divided segments of the calyx ; Fig. 3, a petal, showing the fringe in the throat of the corolla-tube and a stamen removed from its recess ; Fig. 4, part of the corolla-tube, as seen from within, showing the position of the anthers and the ligule-like corona ; Fig. 5, a stamen from within, showing the hairy connective ; Fig. 6, the gynæceum, with the carpels showing above the top of one of the nectaries ; Fig. 7, the calyx and ovary, as seen from above ; Fig. 8, the calyx and follicles, enlarged ; Fig. 9, the two follicles ; Fig. 10, a longitudinal section through one of them ; and Fig. 11, one of the seeds. Figs. 5 and 6 and 8 to 11 are enlarged.

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